

# ROAD SAFETY AUDIT

Salem Road at South Street

Town of Tewksbury

October 28, 2016

Prepared For:  
Massachusetts Department of Transportation



Town of Tewksbury, Massachusetts



Prepared By:  
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## Background

TEC, Inc., (TEC) in cooperation with the Town of Tewksbury and the Massachusetts Department of Transportation (MassDOT), is evaluating the existing traffic safety characteristics at the Salem Road / South Street intersection in Tewksbury, Massachusetts. TEC is conducting this safety evaluation as the first step towards for MassDOT Project #608346, the reconstruction of the three-intersection triangle of Main Street (Route 38), Salem Road, and South Street.

### *Road Safety Audit Justification*

In conjunction with the preliminary design (pre-25% Design) stage for these improvements, TEC is submitting this Road Safety Audit (RSA) report for the Salem Road / South Street intersection. An RSA, as defined by the Federal Highway Administration (FHWA), is the *formal safety performance examination of an existing or future road or intersection by an independent, multidisciplinary team*. The purpose of the RSA is to observe, identify, and report all safety issues and identify future opportunities for safety enhancement improvements for all roadway users. This includes identifying both short-term and long-term safety enhancements that can be implemented through general maintenance, immediate installation/removal, or could be potentially incorporated into future improvement projects. Enhancements, or improvements, can take the form of one or more of the 4 E's; including: Engineering, Education, Emergency Response, and Enforcement.

The U.S. Congress enacted the “Safe, Accountable, Flexible, Efficient, Transportation Act - A Legacy for Users” (SAFETEA-LU) in August 2005. This act provides guidance and funding for the implementation of a State Highway Safety Improvement Program (HSIP). As part of this Program, all states are required to develop a Strategic Highway Safety Plan (SHSP). The Massachusetts Department of Transportation (MassDOT) guidelines require an RSA be conducted where HSIP-eligible crash clusters are present within the study area of a transportation improvement project prior to commencing or finalizing a 25% Design; in this case. An intersection is defined as HSIP-eligible if the intersection is within the top 5% of clusters in its respective Regional Planning Commission (RPC) boundaries based on Equivalent Property Damage Only (EPDO). EPDO rates crashes based on the crash severity.

Based on the published MassDOT database, the intersection of Salem Road / South Street is designated as 2014 HSIP-eligible (current eligibility) and is listed as #46 on the MassDOT 's 2013 Top Crash Location Report (current listing).

## Project Data

TEC of Lawrence, Massachusetts is the primary traffic safety investigation consultant in this RSA for the Salem Road / South Street intersection. The RSA was conducted on Friday, September 9, 2016 at 9:00 AM, with the pre- and post-audit meetings held at the Tewksbury Police Department Headquarters, located at #918 Main Street in Tewksbury, Massachusetts. A copy of the RSA agenda can be found in Appendix A. TEC has also conducted various other field visits to the audit location as part of its project scoping process.

As presented in Table 1 below, the audit team consisted of a cross-section of state, regional, and local engineering, enforcement, maintenance, and emergency response professionals and was assembled in conjunction with input from MassDOT's Traffic Safety Management Unit. Contact information for all participating audit team members is provided in Appendix B.

**Table 1: Participating Audit Team Members**

<b>Audit Team Member</b>	<b>Agency/Affiliation</b>
John Voto	Tewksbury Police Department
Patrick Harrington	Tewksbury Police Department
Michael Hazel	Tewksbury Fire Department
Jon Marchand	Tewksbury School Department
Kevin Hardiman	Tewksbury Department of Public Works
Brian Gilbert	Tewksbury Department of Public Works
Lisa Schletzbaum	MassDOT Traffic Safety
Connor Keating	MassDOT Traffic Safety
Derek Caldwell	MassDOT District 4
Timothy Paris	MassDOT District 4
Justin Howard	Northern Middlesex Council of Governments
Mikel Myers	TEC, Inc.
Samuel Gregorio	TEC, Inc.
Eric Paquette	TEC, Inc.

Audit participants were provided with materials to review prior to the audit meeting. The materials included a summary of crash data, collision diagrams (See Appendix), a summary of the type and severity of crashes, and traffic volume data. Participants were encouraged to visit the site prior to the audit and were urged to consider elements on MassDOT's Safety Review Prompt List.

On the day of the audit, a pre-audit meeting was held to discuss the project's background, the audit process, review the distributed materials, and discuss some of the issues that Team members had observed individually. The audit site walk consisted of field observations at the audit intersection. Handwritten notes and photographs documented the observations made by audit team members during the site walk. Following the audit site walk, a post-audit meeting was held where the Team confirmed the observations made in the field and offered solutions to enhance the safety of areas noted in the site walk and pre-audit meeting.

## Project Location and Description

The RSA was conducted at the Salem Road / South Street intersection in the Town of Tewksbury, Massachusetts. A Study Area Location Map is provided in Figure 1. A detailed description of the study area roadways and intersections is provided below:

### **Existing Geometry and Infrastructure Summary**

#### ***Salem Road***

Salem Road is a two-lane, northwest-southeast, urban collector roadway under the jurisdiction of the Town of Tewksbury. For the purposes of this audit report, the cardinal direction of Salem Road will be noted as east-west. From its terminus at Main Street (Route 38) immediately west of the South Street, the roadway continues easterly to the Town of Wilmington. The roadway is often utilized as a cut-through roadway from Route 38 to Interstate 93 via Interchange 41 (Route 125) or Interchange 40 (Route 62). Salem Road is approximately 26 feet wide and provides one travel lane in each direction within the study area. Directional flow along the roadway is separated by a double yellow centerline. The posted speed limit along Salem Road is generally 30 MPH, as supported by MassDOT Speed Regulation #617-A. Immediate west of its intersection with South Street, the speed limit along Salem Road is posted at 20 MPH through a school zone for the Louise Davy Trahan Elementary School. Sidewalks are provided along the northerly side of the roadway. Land uses along Salem Road within the study area include residential and educational uses.

#### ***South Street***

South Street is a two-lane northeast-southwest urban collector roadway under the jurisdiction of the Town of Tewksbury. For the purposes of this audit report, the cardinal direction of South Street will be noted as north-south. South Street continues to the north for 2-miles into a heavy residential section of South Tewksbury. To the south, South Street provides connection to North Wilmington via Lake Street. South Street is approximately 30 feet wide and provides one travel lane in each direction. Directional flow along the road is separated by a double yellow centerline. The posted speed limit is 25 MPH within the vicinity of the study area, as supported by MassDOT Speed Regulation #3044. Within the study area, sidewalks are provided only along south side of South Street. Land uses along the studied roadway corridor are commercial and residential uses.

#### ***Intersection: South Street / Salem Road***

South Street intersects Salem Road to form a four-way, two-way STOP controlled unsignalized intersection. The South Street approaches consist of a single general-purpose travel lane operating under STOP control. The Salem Road approaches consist of a single general-purpose travel lane, operating under free-flow conditions. An overhead two-way STOP-control flasher is present at the intersection. Directional flow along each approach is separated by a double yellow centerline. On the South Street northbound approach, vehicles have been observed to form two lanes of traffic, with the right-most lane operating as a right-turn lane to bypass vehicles stopped to turn left or pass through the intersection. Crosswalks are present across the southbound and westbound approaches.





1" = 300'

# Salem Road / South Street - Tewksbury, Massachusetts

Road Safety Audit



Figure 1

Project Location Map



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### **Sight Distance Measurements**

TEC visited the site on Monday, July 25, 2016 to measure the available sight distances along the study area roadways. The available sight distances were compared to minimum requirements established by the American Association of State Highway and Transportation Officials (AASHTO).

Sight distance represents the length of roadway that is visible to a driver traveling within the roadway. Two types of sight distance are typically evaluated for driveways and intersections: stopping sight distance (SSD) and intersection sight distance (ISD). SSD is the minimum distance required for a driver traveling along a roadway to perceive an object in the roadway and stop safely in advance of the object when traveling on a wet pavement surface. SSD is measured from an eye height of 3.5 feet to an object height of two (2) feet above the ground, which is equivalent to a driver viewing the taillight of a vehicle ahead. SSD is measured along the centerline of the travel lane approaching the driveway or intersection.

ISD represents the length of the roadway visible to a driver waiting to exit a driveway or minor street. The minimum ISD desired are based on the distance required for a driver to exit a minor street onto a major street without requiring an approaching vehicle to reduce its speed from the design speed to less than 70 percent of the design speed. ISD is measured from an eye height of 3.5 feet to an object height of 3.5 feet, and is measured from a distance 14.5 feet off the edge of the travel-way of the major roadway to represent a driver waiting to exit a driveway or minor roadway. Note that at the audit intersection, the STOP-line on the South Street northbound approach is marked 32 feet back from the intersection. The ISD in this case is still measured from a point 14.5 feet off the edge of the travel-way (the near shoulder line) along Salem Road.

SSD is typically considered the critical sight distance, as it represents the minimum distance required for safe stopping, while ISD represents an acceptable speed reduction for approaching vehicles. The ISD, however, must be at least equal to the minimum required SSD in order to prevent a driver from entering the roadway when an approaching vehicle is too close to safely stop. The guidance provided by AASHTO states:

*“If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions. However, in some cases, this may require a major-road vehicle to stop or slow to accommodate the maneuver by a minor-road vehicle. To enhance traffic operations, intersection sight distances that exceed stopping sight distances are desirable along the major road.”*

Tables 2 and 3 provide a summary of the available SSD and ISD at the study intersection, respectively. The design speed of the intersection approaches are currently unknown but were generally expected to be between 30 MPH and 35 MPH. For calculation purposes, the 85<sup>th</sup> percentile speed measured from the ATRs was utilized as the design speed to provide a conservative depiction of sight distance criteria.

**Table 2: Stopping Sight Distance Summary**

<b>Approach / Direction</b>	<b>Design Speed <sup>(a)</sup></b>	<b>Minimum Required</b>	<b>Measured Sight Distance</b>
Salem Road EB	38	280 FT	>500 FT
Salem Road WB	36	260 FT	>500 FT

<sup>a</sup> 85<sup>th</sup> percentile speed utilized as measurement of “Design Speed” for Salem Road approaches

**Table 3: Intersection Sight Distance Summary**

<b>Approach / Direction</b>	<b>Design Speed <sup>(a)</sup></b>	<b>Minimum Recommended ISD</b>	<b>Desired ISD</b>	<b>Field Measured ISD</b>
South Street NB – Looking East	36	260 FT	400 FT	>500 FT
South Street NB – Looking West	38	280 FT	420 FT	>500 FT
South Street SB – Looking East	36	260 FT	400 FT	170 FT
South Street SB – Looking West	38	280 FT	420 FT	>500 FT

<sup>a</sup> 85<sup>th</sup> percentile speed utilized as measurement of “Design Speed” for Salem Road approaches

The sight distance measurements as shown in Tables 2 and 3 indicate that the SSD approaching the intersections meets minimum recommendations for safe operations. The measurements also indicate that the ISD generally meets both minimum recommended and desired sight lines, with exception of the South Street southbound approach looking east. This sight line is currently limited by the bushes and a utility pole on the northeast corner of the intersection. Note, that these measurements were conducted assuming a driver eye distance of 14.5 feet from the edge of travel way. On the South Street northbound approach, as vehicle must advance past the STOP line in order to proceed to this sight distance parameter. In addition, a green plastic mesh fence for a former whiffle ball field is located within the sight triangle from the South Street northbound approach looking east. At this time, a driver can visibly see through the mesh fence and therefore it was not considered the primary restriction of the sight line.

The sight distance measurements shown in Tables 2 and 3 were measured during the summer months at a period of peak vegetation. However the vegetation along the southwest corner of the intersection, including the Japanese Knotwood, had been recently trimmed prior to TEC’s observations. Therefore, the sight lines across this corner of the intersection are expected to vary pending the period of year and the consistency of trimming. More information regarding this corner of the intersection is described in the following sections.

### **General Crash History**

Crash incident reports for the Salem Road / South Street intersection was compiled and analyzed for the most-recent consecutive four-year period (2011-2014) on file with the Town of Tewksbury Police Department and supplemented by crash reports provided by MassDOT (2011-2014). The motor vehicle crash data was reviewed to determine if any crash trends exist within the study area.

In addition to examining the number of crashes at the Salem Road / South Street intersection, a crash rate was calculated to compare the occurrence of crashes to the volume of traffic passing through the intersection. The crash rate per million entering vehicles (MEV) was calculated using the evening peak hour volume from the TMCs, and the K-factor of 0.100 was determined from ATR counts conducted



along Salem Road and South Street. The crash rate at the Salem Road / South Street intersection was compared to the statewide and district-wide averages published by MassDOT in February 2016 to determine the significance of the crash occurrence. The statewide average for unsignalized intersections is 0.58, and the District 4 average for unsignalized intersections is 0.56.

The crash rate per MEV for the Salem Road / South Street intersection is provided in Table 4.

**Table 4: Crash Rates by Intersection**

Intersection	Total Crashes	Crash Rate
Salem Road @ South Street	79	2.99

Below is a crash history summary for the Salem Road / South Street intersection. Further information regarding crashes is provided in the General Observations chapter. A detailed breakdown of the reported collisions is provided in Table 5.

***Intersection: Salem Road / South Street***

The Salem Road / South Street intersection experienced an average of approximately 20 crashes per year over the four-year study period, yielding a crash rate of 2.99 crashes per MEV, more than five times greater than the statewide and district-wide averages. 89 percent (70 of 79) of the crashes were angled-type crashes, and an additional five (5) percent (4 of 79) of the crashes were sideswipe crashes. All of the sideswipe collisions involved a vehicle attempting to make a left-turn without yielding the right-of-way (i.e. same characteristics as the angled crashes). Of the 70 reported angled crashes, 83 percent (53 of 70) involved a vehicle operating northbound on South Street. Generally, these angled crashes were evenly split between the second vehicle travelling eastbound or westbound along Salem Road. Approximately 30% of the crashes occurred during the period immediately subsequent to the weekday commuter peak (6:00 PM to 9:00 PM). Over three-quarters of all crashes listed failure to yield the Right-of-Way or disregarding the traffic controls as the contributing factor for the crash.

Note that the crash data provided as part of the Appendix indicates the main contributing factor of the crash that was included on the crash report and may not be indicative of what is described in the report narrative. Further details regarding the crash data is noted in the following RSA sections.

Table 5: Crash Data Summary

		Salem Road @ South Street
<b>Crash Year:</b>	2011	27
	2012	21
	2013	16
	2014	15
<b>TOTAL</b>		<b>79</b>
<b>Annual Average</b>		<b>19.75</b>
<b>Crash Rate (MEV)</b>		<b>2.99</b>
<b>Occurrence Significance?</b>		<b>Yes</b>
<b>Type:</b>	Angle	70
	Rear-End	2
	Rear-to-Rear	0
	Sideswipe	4
	Head-on	1
	Single Vehicle	1
	Ped / Bike	0
	Not Reported	1
<b>TOTAL</b>		<b>79</b>
<b>Surface Conditions:</b>	Dry	53
	Wet	24
	Snow / Ice / Slush	1
	Other / Unknown	1
<b>TOTAL</b>		<b>79</b>
<b>Severity:</b>	Property Damage	56
	Non-Fatal Injury	23
	Not Reported	0
<b>TOTAL</b>		<b>79</b>
<b>Day of Week:</b>	Monday-Friday	56
	Saturday-Sunday	23
<b>TOTAL</b>		<b>79</b>
<b>Time of Day:</b>	6:00AM-9:00AM	15
	9:00AM-12:00PM	10
	12:00PM-3:00PM	18
	3:00PM-6:00PM	13
	6:00PM-9:00PM	21
	9:00PM-6:00AM	2
<b>TOTAL</b>		<b>79</b>

# Audit Observations and Potential Safety Enhancements

Pre- and post- RSA site walk meetings were held at the Tewksbury Police Department, located at #918 Main Street in Tewksbury. The pre-audit meeting included brief introductions, an overview of the future design project and RSA process, and an overview of the safety characteristics of the Salem Road / South Street intersection. Each participant was asked to provide his or her concerns and comments related to the safety issues at the intersection.

The RSA Team's field observations and discussions show that the Team has several general concerns about existing conditions at the Salem Road / South Street intersection that may negatively impact safety. Several of these concerns require further evaluation and design work to develop appropriate safety enhancements. More specific safety challenges located at the audit area intersection are also included.

## **Summary of Safety Concerns**

The RSA Team identified the following safety issues at the Salem Road / South Street intersection prior to, during, and after the field visit:

- Restricted Sightlines
- Vertical Curvature on Salem Road
- Improperly Located STOP Bars
- Unexpected, Disregarded, or Assumed STOP Condition
- Poor Pavement Friction
- By-passing Traffic and Courtesy Gaps
- Lost Drivers
- Inappropriate Signage
- Lack of Bicycle and Pedestrian Accommodations
- Speed

The following section provides a detailed summary of the identified safety concerns and potential safety enhancements along the corridor and at the several intersections.

### ***Safety Issue #1: Restricted Sightlines***

TEC conducted an inventory of the sightlines available for the two STOP-controlled approaches at the Salem Road / South Street intersection. This inventory revealed several sightline deficiencies which are summarized below.

Specific Observations:

*Invasive Plant Species* – The property on the southwestern corner of the Salem Road / South Street intersection (#422 South Street) suffers from an invasive plant species known as Japanese Knotwood. The perennial weed is currently located on private property, but has spread onto Town of Tewksbury Right-of-Way (ROW) consistently in the past. The Town of Tewksbury Department of Public Works (DPW) identified that the weed is trimmed up to the property line twice each year; however, the sightline looking west from the South Street northbound approach can be limited severely by this weed as it grows back in between trimmings. Due to its large underground network of strong roots, the weed is resilient to above-ground cutting, continuing to re-sprout from its roots year after year. The crash reports indicated that 30 crashes at this intersection involved a vehicle travelling northbound along South Street and a vehicle travelling eastbound along Salem Road. The presence of vegetation overgrowth may have been a contributing factor in the crashes.



**Image 1: Trimmed Japanese Knotwood at the intersection.**

*Large Snow Banks* – Two (2) crash reports indicated the presence of large snow banks at the intersection corners blocking driver visibility of oncoming traffic. Snow banks that are not maintained force drivers to creep into the intersection in order to improve visibility and sight lines. The Town of Tewksbury DPW indicated that Salem Road and South Street are priority roadways during snow events and that sidewalks in the area are currently plowed by the Town due to the close proximity to the Trahan School.

*Shrubs, Fences, and Utility Poles*

Northwestern Corner – Shrubs currently exist on private property on the northwestern corner of the Salem Road / South Street intersection. While the shrubs on this corner of the intersection appear to be trimmed regularly by the property owners, it is important to note that the South Street southbound sightline looking west would be reduced if these shrubs ever became overgrown. The crash reports indicated that nine (9) crashes at this intersection involved a vehicle travelling southbound along South Street and a vehicle travelling eastbound along Salem Road. The presence of vegetation overgrowth may have been a contributing factor in the crashes.

Northeastern Corner - In their current state, the bushes on the northeastern corner of the Salem Road / South Street intersection reduce the sightline looking east from the South Street southbound approach. In addition, a chain-link fence along the property line and a large utility pole located approximately 90 feet east of the intersection further restrict the sightline. During field observations and measurements, the ISD from the South Street southbound approach, looking east, was measured at 170 feet, which is well below minimum recommendations set by the AASHTO. At the design speed of



**Image 2: Bushes and utility pole seen obstructing sightlines on the intersection's northeastern corner.**

36 MPH<sup>1</sup>, the minimum recommended ISD is calculated at 260 feet with a desired ISD of 400 feet. The crash reports indicated that six (6) crashes at this intersection involved a vehicle travelling southbound along South Street and a vehicle travelling westbound along Salem Road. The presence of vegetation overgrowth may have been a contributing factor in the crashes.

Southeastern Corner – A wood-framed fence with green plastic mesh is currently located on the southeastern corner of the Salem Road / South Street intersection. Drivers on the South Street northbound approach looking east are forced to look through the green mesh in the fence as they approach the intersection to see vehicles traveling along the Salem Road westbound approach. Per representatives of the Tewksbury Fire Department and Tewksbury Police Department, this fence was constructed many years ago for a whiffle ball field located on Town of Tewksbury property. At present, the whiffle ball field no longer exists, and the fence could be removed. In addition, tree branches from the nearby tree appear to sag low near the sight line.



**Image 3: 2013 view (above) vs. 2016 view (below) of whiffle ball field fence and vegetation along the southeastern corner. (Google Earth)**

The density of the vegetation has grown over past years as shown in the comparison of 2013 and 2016 views to the right. The crash reports indicated that 32 crashes at this intersection involved a vehicle travelling northbound along South Street and a vehicle travelling westbound along Salem Road. The presence of the mesh fence and vegetation may have been a contributing factor in the crashes.



### *Solar Glare*

It was noted by a Town of Tewksbury Police Officer that solar glare currently makes it difficult for drivers to see along Salem Road westbound where the direction of travel and lack of overhead canopy invites direct sunlight onto the roadway. A prominent pattern in the crash data indicated 27% of the crashes occurred between 6:00PM and 9:00PM, the period in which glare may be an issue for Salem Road westbound vehicles. Only one (1) crash noted that solar glare contributed to the crash; however seven (7) crashes occurred along Salem Road westbound during this three-hour time period. The solar glare could also blind motorists entering the intersection from the South Street northbound and southbound approaches when they look westbound to see if it is safe to proceed into the intersection.



**Image 4: Solar glare along Salem Road westbound. (Google Earth)**

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<sup>1</sup> Actual design speed of approach unknown - design speed noted as 85<sup>th</sup> percentile speed of approach.



Potential Safety Enhancements:

1. Continue to trim Japanese Knotwood plant on the southwest corner of the intersection to maintain sight lines.
2. Receive permission from the property owner at #422 South Street (southwestern corner of the intersection) to fully remove the Japanese Knotwood weed from their property. This would entail excavating the weed's large root network underneath the ground. As a result, sightlines looking west for the South Street northbound approach will be greatly improved.
3. Ensure Town DPW officials clear up the snow banks at the intersection corners after periods of significant snowfall when the roadways are plowed.
4. Work with the property owner at #54 Salem Road (northwest corner) to continue maintenance of the shrubs on private property and along the ROW.
5. Work with the property owner at #439 South Street to shift the location of the bushes and shrubs that are within the sight line to a location outside of the sight line to improve intersection sight distances.
6. Remove the whiffle ball field fence along the southeastern corner of the intersection as it is no longer in use. Trim the low tree branches to the adjacent tree as necessary to maintain sight lines.
7. Consider modifying the traffic control at the intersection to four-way STOP-control to reduce the impact of limited sight lines on the side-street approaches. Note that traffic warrants should be conducted at the intersection prior to the installation of additional STOP-controlled approaches.
8. Consider the installation of traffic signal control at the intersection in order to reduce the uncontrolled conflict points and reduce the impact of limited sight lines on the side-street approaches. Note that traffic warrants should be conducted at the intersection prior to the installation of a traffic control signal.
9. Should a traffic signal be installed at the intersection, install retroreflective backplates to all signal heads to provide increased visibility and decrease the effects of solar glare.
10. Consider the installation of a roundabout at the intersection in order to reduce the uncontrolled conflict points and decreasing the approach speed at the intersection. Note that the construction of a roundabout may require the acquisition of private property on multiple corners of the intersection.
11. Modify the flow pattern of South Street, south of the intersection, to a one-way southbound roadway exiting the intersection. This would remove the significant crash movement from the intersection. The change in traffic flow may significantly alter

safety/traffic operations at the adjacent Main Street / South Street and Main Street / Salem Road intersections.

12. The Town of Tewksbury should consider adopting a “Line-of-Sight Obstructions at Roadway Intersections” By-Law to assist in preventing obstructions within the intersection sight triangle.
13. Provide signage along Salem Road westbound located upstream from the intersection to provide warning of solar glare during the evening hours as drivers approach the intersection.

### ***Safety Issue #2: Salem Road Vertical Curvature***

#### ***Specific Observations:***

*Sags in Roadway Grading* – While Salem Road is relatively flat west of the Salem Road / South Street intersection, there are multiple sags in the roadway’s vertical curvature along Salem Road east of the intersection. Due to the multiple vertical curves along the Salem Road westbound approach, larger vehicles can block the view of smaller passenger cars operating immediately behind them. A vehicle stopped on either South Street approach waiting to pull into the intersection may believe that the right-of-way is clear after the larger vehicle passes through the intersection, creating the potential for an angled collision with the smaller passenger car traveling behind the larger vehicle. The crash reports indicated that 38 of the crashes noted at the intersection involved a vehicle travelling along Salem Road westbound. The presence of various sag and crest curves within the roadway profile may have been a contributing factor in these crashes.



**Image 5: Sags in roadway profile along Salem Road east of the intersection.**

#### ***Potential Safety Enhancements:***

1. Reconstruct the vertical profile of Salem Road east of the Salem Road / South Street intersection to remove the sag and crest vertical curves along the roadway. This would prevent smaller passenger vehicles from being lost from view within the sags of the vertical curves and obstructed from view when traveling behind a larger vehicle. This improvement will require profile alterations to several driveways and side-street approaches within the limits of corridor profile reconstruction.

### ***Safety Issue #3: Improperly-Located STOP-Bars***

#### ***Specific Observations:***

*STOP-Bar Too Far from the Edge of Travel Way* – The current STOP-bar on the South Street northbound approach is located 32 feet from the travel-way. Manual on Uniform Traffic Control Devices (MUTCD) provide guidance for STOP-lines to be placed a minimum



**Image 6: STOP bar on the South Street northbound approach is too far from the edge of the travel way.**

of 4 feet in advance of the nearest crosswalk line at controlled intersection, but should not be placed more than 30 feet from the nearest edge of intersecting traveled way. As observed during the RSA, numerous vehicles did not stop at the marked STOP -bar due to its extreme distance away from Salem Road; instead, these vehicles rolled through the STOP-bar and sign to the edge of the travel-way in order to see vehicles approaching from either direction on Salem Road. Assuming a vehicle was to stop at the current marking location, sightlines in both directions are nearly non-existent. Upon inspection, it appears that the STOP-bar and sign may be located at its current location due to the proximity of an adjacent utility pole. It was noted that the location of the STOP-line and sign may be related to maneuvers for a fire apparatus entering South Street from Salem Road. Moving the STOP-bar and sign to an appropriate location may force the sign to not be visible behind the utility pole or may affect the turning ability of a fire apparatus. The crash reports indicated that 59 crashes involved a vehicle travelling northbound along South Street. The location of the existing STOP-bar and signage away from the intersection, as well as vehicles tending to “roll” into the intersection for improved sightlines, may have been a contributing factor in the crashes.

*Potential Safety Enhancements:*

1. Relocate the STOP-bar and STOP-sign south of the intersection closer to the intersection. This may require the relocation of the existing utility pole or the installation of a supplemental STOP-sign on the westerly side of the South Street northbound approach. Truck turns should be evaluated upon any movement in STOP-bar and signage.
2. Paint supplemental “STOP” pavement markings prior to the STOP-bar to reinforce the STOP-controlled condition on the South Street approaches.

***Safety Issue #4: Unexpected, Disregarded, or Assumed STOP Condition***

*Specific Observations:*

*Free-flow Conditions* – South of Main Street, South Street is free-flowing for its entire duration. South Street then undergoes a name change to Lake Street at the Wilmington town border, where it continues as free-flowing until reaching a signalized intersection at Shawsheen Avenue (Route 129), located approximately 1.5-miles south of the signalized Main Street (Route 38) intersection in Tewksbury. North of Salem Road, South Street is free-flowing until an unsignalized intersection at Bridge Street, located approximately 1-mile north of the Salem Road intersection. Due to the long stretches of free-flowing traffic conditions along South Street in either direction, drivers may not expect a STOP condition at the Salem Road intersection. The crash reports indicated that fifteen (15) crashes were the direct result of disregarding the traffic controls at the intersection and fourteen (14) crashes specifically noting that the vehicle along South Street did not come to a stop at the STOP-sign.

*Roadway Geometry* – North of Salem Road, South Street features very winding roadway geometry. Approximately 300-feet north of the intersection, South Street straightens out, providing southward visibility to the signalized intersection at Main Street (Route 38). Town of Tewksbury Police Department representatives described this straight section of South Street as a natural throughway, especially for inexperienced drivers. By seeing the signalized intersection up ahead, drivers along the southbound approach may not expect having to stop at Salem Road before reaching the signalized intersection.

*Overhead Flashing Beacons* – As sourced from a Federal Highway Administration (FHWA) publication *Safety Evaluation of Flashing Beacons at STOP-Controlled Intersections* dated April 2008:

*“There is anecdotal evidence that suggests that the overhead beacons have been interpreted as indicating a four-way stop at locations that were in fact only a two-way stop. This has caused motorists to pull out in front of the approaching vehicles because they assumed the approaching vehicle would be stopping.”*



**Image 7: Overhead flashing beacons at the intersection.**

Due to the presence of flashing beacons on all four approaches, drivers operating on the South Street approaches may expect Salem Road cross-traffic to stop because they cannot see the yellow color of the flashing beacons on the Salem Road approaches. The intersection does currently have supplemental signage with STOP signs indicating that cross traffic does not stop. Two (2) crashes noted specifically that the driver of the vehicle along South Street believed the intersection to be a four-way STOP-controlled intersection when he/she proceeded into the intersection.

*Potential Safety Enhancements:*

1. Reinstall a STOP-sign on the westerly side of South Street on the northbound approach. Per Google Earth street view, two (2) STOP-signs were present along this approach in 2013 after installation by a previously MassDOT project; however, the STOP-sign on the westerly side of South Street has since been knocked down or removed.
2. Paint supplemental “STOP” pavement markings prior to the STOP-bar to reinforce the STOP-controlled condition on the South Street approaches.
3. Remove the overhead flashing beacons from the intersection to reduce the potential misconception that the intersection operates under a four-way STOP condition.
4. Consider modifying the traffic control at the intersection to a four-way STOP-controlled intersection. Note that traffic warrants should be conducted at the intersection prior to the installation of additional STOP-controlled approaches.
5. Consider the installation of traffic signal control at the intersection in order to reduce the uncontrolled conflict points at the intersection. Note that traffic warrants should be conducted at the intersection prior to the installation of a traffic control signal.
6. Consider the installation of a roundabout at the intersection in order to reduce the uncontrolled conflict points at the intersection. Note that the construction of a roundabout may require the acquisition of private property on multiple corners of the intersection.

### ***Safety Issue #5: Pavement Condition, Drainage and Friction***

#### **Specific Observations:**

***Pavement Condition and Drainage*** – Although generally it appears that the pavement conditions along the immediate approaches is in above-average condition, locations of past trenching are clearly visible within the intersection. In addition, the edge of pavement along the South Street northbound approach and corners is lacking any vertical curbing or berm. The lack of vertical separation has allowed by gravel and other small debris to enter the roadway (although visibly only within the striped shoulders). Along the

southwest corner of the intersection, a catch basin is located at the edge of pavement with no curbing/berm on the back side of the structures. Sand and gravel is clearly visible within the roadway which is a product of soil from the adjacent property flowing towards the catch basin during rain events.



**Image 8: Soil from adjacent property covering paved roadway shoulder on southwest corner of intersection.**

***Pavement Friction*** - On the morning of the RSA, the Salem Road / South Street intersection experienced rain showers that left the pavement wet and slick. No ponding was noted at the time. Prior to and again during the RSA field visit, vehicles were observed spinning their tires as they accelerated to cross the intersection after coming to a stop on the South Street northbound approach. During the RSA, an Audit representative noted that the overall pavement friction at the intersection may be low. It should be noted that 30 percent of the crashes over the four-year period occurred on wet pavement. The lack of friction combined with the wet pavement could be stalling the vehicle's forward momentum across the intersection as it attempts to cross the intersection within a visible gap in traffic.



**Image 9: Pavement skid marks at the intersection.**

#### **Potential Safety Enhancements:**

1. Consider isolated repair of poor pavement and curbing areas, such as the southwest corner of the intersection which currently does not include vertical curbing.
2. Consider a mill and overlay of the entire intersection and the several approaches with higher friction pavement.

### ***Safety Issue #6: By-Passing Traffic and Courtesy Gaps***

#### **Specific Observations:**

***By-Passing Traffic*** - It was observed during the RSA that South Street northbound right-turning vehicles would frequently attempt to by-pass left-turning or through traffic along the approach forming two lanes



of traffic. As the two vehicles are immediately adjacent, sight lines are further restricted on the approach by the adjacent vehicle. In addition, a similar trend was noted by Audit participants for vehicles stopped to turn left from Salem Road westbound onto South Street. There are currently no striped turn lanes at the intersection.

*Courtesy Gaps* - Several audit participants acknowledged frequent “courtesy” extended to the drivers exiting the side street or attempting to take the opposing left-turn; where one driver with the right-of-way, waves the side street driver to proceed even when the right-of-way may not be with that driver. This may cause the side street driver to pull out without consideration of other mainline vehicles on Salem Road. It was suggested that extending “courtesy” to the drivers exiting the side street may be the cause of several angled crashes where drivers were unaware of the aforementioned “courtesy.” The crash reports indicated that three (3) crashes were the result of “courtesy” extended to the side-street driver; however all three (3) of these crashes resulted in striking the original vehicle extending the “courtesy” and not a separate vehicle.

*Potential Safety Enhancements:*

1. Consider altering the pavement markings on the South Street northbound approach to discourage drivers from forming two lanes of traffic. These markings may include shoulder hatching or a shift on the longitudinal lane/center lines to reduce the width of the northbound right shoulder, while still providing Town fire apparatus with a sufficient ability to turn.
2. Consider modifying the traffic control at the intersection to a four-way STOP-controlled intersection to reduce the occurrence of courtesy gaps in traffic. Note that traffic warrants should be conducted at the intersection prior to the installation of additional STOP-controlled approaches.
3. Should a traffic signal be recommended, consider the implementation of protected left-turn phasing to reduce the occurrence of courtesy gaps in traffic.

***Safety Issue #7: Lost Drivers***

*Specific Observations:*

*Drivers Asking for Directions* – The Tewksbury Fire Chief noted that drivers historically show up lost at the fire station, located adjacent to the Salem Road / South Street intersection. The Fire Chief noted that these lost drivers are typically looking for directions to the Elks Lodge, located on South Street north of the intersection. An Elks Lodge guide sign is currently provided on the South Street northbound approach; however, signage for the Elks Lodge is not present along Salem Road. Additionally, an RSA participant noted that it is not uncommon to find a driver stopped in the middle of the intersection asking nearby pedestrians for directions to Interstate 93. Guide signage for Interstate 93 is not currently provided along Salem Road, South Street, or Main Street (Route 38), despite Salem Road providing access to Interchanges 40 and 41 along Interstate 93.

*Potential Safety Enhancements:*

1. Install informational signs for the Elks Lodge on the Salem Road approaches.
2. Consider installing trailblazer assembly signs for Interstate 93 on the South Street northbound approach and the Salem Road eastbound approach to the intersection.

***Safety Issue #8: Inappropriate Signage***

*Specific Observations:*

At the time of the RSA, two “Dangerous Intersection” signs were along each Salem Road intersection approach. It was noted by a MassDOT representative that these signs should be removed as they indicate safety issues with the intersection and place liability on the Town of Tewksbury.



**Image 10: “Dangerous Intersection” sign located on one of the intersection approaches.**

*Potential Safety Enhancements:*

1. Remove all “Dangerous Intersection” signs from the intersection approaches.

***Safety Issue #9: Lack of Bicycle and ADA-Compliant Pedestrian Accommodations***

*Specific Observations:*

*Bicycle Accommodations* – There are currently no bicycle accommodations provided along South Street or Salem Road in the vicinity of the intersection. On the intersection approaches, the shoulder are relatively narrow and do not provide sufficient space as a bike-able shoulder. No crashes during the four-year study period at the intersection involved a bicyclist.

*Pedestrian Accommodations* - It was noted during the RSA that the intersection lacks ADA-compliant pedestrian accommodations, including accessible ramps, detectable warning strips or advanced pedestrian warning signage. Furthermore, RSA participants observed roadway debris accumulating where the current ramps meet the edge of the roadway. No crashes during the four-year study period at the intersection involved a pedestrian.



**Image 11: Lack of accessible curb ramps with debris on the intersection's northwest corner.**

*Potential Safety Enhancements:*

1. Consider the construction of dedicated bicycle lanes along South Street and Salem Road on the approaches to the intersection.

2. Consider the installation of shared-use lane markings “sharrows” with accompanying “Share the Road” (W16-1) signage along South Street and Salem Road on the approaches to the intersection.
3. Construct new and reconstructed existing sidewalks along the approaches and at the corners of the intersection.
4. Construct new ADA/AAB compliant accessible curb ramps along each corner of the intersection. Stripe new crosswalks at the intersection.
5. Conduct educational events or distribute pamphlets at the Trahan Elementary School and other surrounding schools to help promote walking and bicycling to school. Use these events and pamphlets to discuss safe walking and biking habits associated with both the existing and any new pedestrian and bicycle infrastructure at the intersection.

### ***Safety Issue #10: Speed***

#### **Specific Observations:**

Excessive speed was noted as the contributing factor in one (1) crash over the four year study period. Based on the traffic counts conducted in July 2016, the 85<sup>th</sup> percentile speed (by all-day ATR) along Salem Road eastbound was measured at 38 MPH and along Salem Road westbound was measured at 36 MPH. Nearly 90% and 75% of the Salem Road eastbound and westbound traffic, respectively, was measured travelling at a speed greater than the posted 30 MPH speed limit. Although speed may not have been noted as the major contributing factor in the crash, the effect that speed has on sight distance may have been a contributing factor in many crashes where vehicles failed to yield the ROW.

#### **Potential Safety Enhancements:**

1. Consider reducing the travel lane widths along South Street and Salem Road to encourage slower speeds along the corridor.
2. Post advisory speed signage along the Salem Road approaches in the vicinity of the intersection.
3. Install dynamic speed radar signage along the Salem Road approaches to inform drivers of their current speed as compared to the posted speed limit.
4. Increase enforcement of speeding at and in the vicinity of the intersection.

## Summary of Road Safety Audit

Each improvement considered has been categorized as short-term, mid-term, or long-term. Additionally, a cost category has been assigned to each improvement based on the definitions shown in Table 6. Table 7 includes a summary of the several potential safety enhancements. Safety benefit estimates are subjective and are based on engineering experience, the relative percent of crashes that may be reduced by the enhancement based on known, and documented crash reduction factors (such as FHWA documented crash reduction factors).

Note that some costs are noted with two cost thresholds. This is included as some enhancements may require additional measures to ensure regulatory compliant. For instance, the relocation of a stop sign is low-cost; however along South Street northbound, the relocation may require the additional relocation of a utility pole. In addition, some enhancements are defined to mitigate multiple safety issues. For those enhancements identified for multiple issues, such as the construction of a roundabout, the enhancement has only been listed once in Table 7.

**Table 6: Estimated Time Frame and Costs Breakdown**

Time Frame		Costs	
Short-Term	<1 Year	Low	<\$10,000
Mid-Term	1-3 Years	Medium	\$10,001-\$50,000
Long-Term	>3 Years	High	>\$50,000

**Table 7: Potential Safety Enhancement Summary**

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost
Restricted Sightlines	Continue to trim Japanese Knotwood plant on the southwest corner of the intersection to maintain sight lines.	High	Short-Term	Low
	Receive permission from the property owner at #422 South Street (southwestern corner of the intersection) to fully remove the Japanese Knotwood weed from their property and potentially the root system which may be below roadway. Should the root system be below roadway, this may require minor roadway reconstruction.	High	Short-Term	Low to Medium
	Ensure Town DPW officials clear up the snow banks at the intersection corners after periods of significant snowfall when the roadways are plowed.	Medium	Short-Term	Low
	Work with the property owner at #54 Salem Road to continue maintenance of the shrubs on private property and along the ROW.	Medium	Short-Term	Low
	Work with the property owner at #439 South Street to shift the location of the bushes and shrubs that are within the sight line to a location outside of the sight line to improve intersection sight distances.	High	Short-Term	Low
	Remove the whiffle ball field fence along the southeastern corner of the intersection as it is no longer in use. Trim the low tree branches to the adjacent tree as necessary to maintain sight lines.	Medium	Short-Term	Low
	Consider modifying the traffic control at the intersection to four-way STOP-control to reduce the impact of limited sight lines on the side-street approaches.	High	Short-Term	Low
	Consider the installation of traffic signal control at the intersection in order to reduce the uncontrolled conflict points at the intersection.	High	Long-Term	High
	Should a traffic signal be installed at the intersection, install retroreflective backplates to all signal heads to provide increased visibility and decrease the effects of solar glare.	Medium	Short-Term	Low
	Consider the installation of a roundabout at the intersection in order to reduce the uncontrolled conflict points at the intersection.	High	Long-Term	High



**Table 7: Potential Safety Enhancement Summary**

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost
Restricted Sightlines	Modify the flow pattern of South Street, south of the intersection, to a one-way southbound roadway exiting the intersection. May require modifications to adjacent intersections.	Medium	Mid-Term	Low to Medium
	The Town of Tewksbury should consider adopting a "Line-of-Sight Obstructions at Roadway Intersections" By-Law to assist in preventing obstructions within the intersection sight triangle.	High	Mid-Term	Low
	Provide signage along Salem Road westbound located upstream from the intersection to provide warning of solar glare during the evening hours as drivers approach the intersection.	Low	Short-Term	Low
Vertical Curvature	Reconstruct the vertical profile of Salem Road east of the Salem Road / South Street intersection to remove the sag and crest vertical curves along the roadway.	High	Long-Term	High
Improperly-Located STOP Bars	Relocate the STOP bar and STOP sign(s) south of the intersection closer to the intersection. May require relocation of utility pole.	High	Short-Term	Low to Medium
	Paint supplemental "STOP" pavement markings prior to the STOP bar to reinforce the STOP condition on the South Street approaches.	Medium	Short-Term	Low
Unexpected, Disregarded, or Assumed STOP Condition	Reinstall a STOP sign on the westerly side of South Street on the northbound approach.	Medium	Short-Term	Low
	Remove the overhead flashing beacons from the intersection.	Low	Short-Term	Low
Pavement Condition, Drainage and Friction	Consider isolated repair of poor pavement and curbing areas, such as the southwest corner of the intersection which currently does not include vertical curbing.	Low	Short-Term	Low
	Consider a mill and overlay of the entire intersection and the several approaches with higher friction pavement.	Medium	Mid-Term	High

**Table 7 Continued: Potential Safety Enhancement Summary**

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost
By-Passing Traffic & Courtesy Gaps	Consider altering the pavement markings on the South Street northbound approach to discourage drivers from forming two lanes of traffic. These markings may include shoulder hatching or a shift on the longitudinal lane/center lines to reduce the width of the northbound right shoulder, while still providing Town fire apparatus with a sufficient ability to turn.	Medium	Short-Term	Low
	Should a traffic signal be recommended, consider the implementation of protected left-turn phasing to reduce the occurrence of courtesy gaps in traffic.	High	Long-Term	Low
Lost Drivers	Install informational signs for the Elks Lodge on the Salem Road approaches.	Low	Short-Term	Low
	Install trailblazer assembly signs for I-93 on the South Street approaches and the Salem Road eastbound approach.	Low	Short-Term	Low
Inappropriate Signage	Remove all “Dangerous Intersection” signs to remove concerns and liability over intersection safety.	Low	Short-Term	Low
Lack of ADA-Compliant Pedestrian Accommodations	Consider the construction of dedicated bicycle lanes along South Street and Salem Road on the approaches to the intersection.	High	Long-Term	High
	Consider the installation of shared-use lane markings “sharrows” with accompanying “Share the Road” (W16-1) signage along South Street and Salem Road on the approaches to the intersection.	Medium	Short-Term	Medium
	Construct new and reconstruct existing sidewalks along the approaches and at the corners of the intersection.	Medium	Long-Term	High
	Construct new ADA/AAB compliant accessible curb ramps along each corner of the intersection. Stripe new crosswalks at the intersection.	Low	Mid-Term	Medium
	Conduct educational events or distribute pamphlets at the Trahan Elementary School and other surrounding schools to help promote walking and bicycling to school. Use these events and pamphlets to discuss safe walking and biking habits associated with both the existing and any new pedestrian and bicycle infrastructure at the intersection.	Medium	Short-Term	Low

**Table 7 Continued: Potential Safety Enhancement Summary**

<b>Safety Issue</b>	<b>Potential Safety Enhancement</b>	<b>Safety Payoff</b>	<b>Time Frame</b>	<b>Cost</b>
Speed	Consider reducing the travel lane widths along South Street and Salem Road to encourage slower speeds along the corridor.	Low	Short-Term	Low
	Post advisory speed signage along the Salem Road approaches in the vicinity of the intersection. Provide “reasonable” enforcement of the advisory speed.	Medium	Short-Term	Low
	Install dynamic speed radar signage along the Salem Road approaches to inform drivers of their current speed as compared to the posted speed limit.	High	Short-Term	Low
	Increase enforcement of speeding at and in the vicinity of the intersection.	High	Short-Term	Low

## Appendix A. RSA Meeting Agenda

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# Agenda

## Road Safety Audit

### LOCATION

#### Meeting Location:

Tewksbury Police Department  
918 Main Street  
Tewksbury, Massachusetts  
Friday, September 9th, 2016  
9:00 AM – 12:00 PM

Type of meeting:	High Crash Location – Road Safety Audit
Attendees:	Invited Participants to Comprise a Multidisciplinary Team
Please bring:	Thoughts and Enthusiasm!

9:00 AM	<b>Welcome and Introductions</b> <ul style="list-style-type: none"><li>• Introductions</li></ul>
9:15 AM	<b>Review of Site Specific Material</b> <ul style="list-style-type: none"><li>• Crash Summaries – provided in advance</li><li>• Existing Geometries and Conditions</li></ul>
10:00 AM	<b>Visit the Site</b> <ul style="list-style-type: none"><li>• Conduct Field Visit</li><li>• As a group, identify areas for improvement</li></ul>
11:00 AM	<b>Post Visit Discussion / Completion of RSA</b> <ul style="list-style-type: none"><li>• Discuss observations and finalize findings</li><li>• Discuss potential improvements and finalize recommendations</li></ul>
12:00 PM	<b>Adjourn for the Day – but the RSA has not ended</b>

#### Instructions for Participants:

- Before attending the RSA on September 9th, participants are encouraged to drive through the South Street / Salem Road intersection and complete / consider elements on the RSA Prompt List, with a focus on safety.
- All participants will be actively involved throughout the RSA process. Participants are encouraged to come with thoughts and ideas; however, remember that the synergy that develops and respect for others' opinions are key elements to the success of the overall RSA process.
- After the RSA meeting, participants will be asked to comment and respond to the document materials to assure it is reflective of the RSA completed by the multidisciplinary team.



## Appendix B. RSA Audit Team Contact List

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## Participating Audit Team Members

Date: September 9, 2016      Location: Tewksbury, Massachusetts

<b>Audit Team Members</b>	<b>Agency/Affiliation</b>	<b>Email Address</b>
<i>Name</i>	<i>Agency</i>	<i>Email</i>
John Voto	Tewksbury Police Department	jvoto@tewksbury-ma.gov
Patrick Harrington	Tewksbury Police Department	pharrington@tewksbury-ma.gov
Michael Hazel	Tewksbury Fire Department	mhazel@tewksbury-ma.gov
Jon Marchand	Tewksbury School Department	jmarchand@tewksbury.k12.ma.us
Kevin Hardiman	Tewksbury Department of Public Works	khardiman@tewksbury-ma.gov
Brian Gilbert	Tewksbury Department of Public Works	bgilbert@tewksbury-ma.gov
Lisa Schletzbaum	MassDOT Traffic Safety	lisa.schletzbaum@state.ma.us
Connor Keating	MassDOT Traffic Safety	connor.keating@state.ma.us
Derek Caldwell	MassDOT District 4	derek.caldwell@state.ma.us
Timothy Paris	MassDOT District 4	timothy.paris@state.ma.us
Justin Howard	Northern Middlesex Council of Governments	jhoward@nmcog.org
Mikel Myers	TEC, Inc.	mmyers@theengineeringcorp.com
Samuel Gregorio	TEC, Inc.	sgregorio@theengineeringcorp.com
Eric Paquette	TEC, Inc.	epaquette@theengineeringcorp.com

## Appendix C. Detailed Crash Data

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Crash Data Summary Tables  
Salem Road @ South Street - Tewksbury, MA  
01/01/2011 - 12/31/2014

Collision Diagram	Crash Number	Crash Date	Crash Time	Ambient Light	Weather Condition	Road Surface	Number of Vehicles	Vehicle Travel Directions				Operator's Age				Crash Severity	Number of NonFatal Injuries	Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Report)
								V1	V2	V3	V4	V1	V2	V3	V4					
1	11-125-AC	1/2/2011	8:55 AM	Daylight	Cloudy	Wet	2	N	W			36	59			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling NB on South St; MV2: traveling WB on Salem Rd. MV1 collided with MV2 when MV1 crossed the intersection without yielding for the NB Salem Rd through lane traffic, causing damages to both vehicles.
2	11-486-AC	1/5/2011	8:55 AM	Daylight	Clear	Dry	2	S	E			80	49			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling SB on South St; MV2: traveling EB on Salem Rd. MV1 collided with MV2 when MV1 crossed the intersection without yielding, causing heavy damage to MV1 and moderate damage to MV2.
3	11-1462-AC	1/15/2011	10:17 AM	Daylight	Clear	Wet	2	N	W			46	28			Property Damage Only	0	Angled	Inattention / Distracted	MV1: traveling NB on South St; MV2: traveling WB on Salem Rd. MV1 and MV2 collidedwhen MV1 crossed the intersection without yielding for the NB Salem Rd through lane traffic.
4	11-2856-AC	1/29/2011	7:20 PM	Dark - Not Lighted	Clear	Wet	2	E	N			40	37			Property Damage Only	0	Angled	Visibility Obstructed	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 due to the snow banks which obstructed the visibility of MV2 while crossing the intersection, causing moderate damages to both cars.
5	11-3391-AC	2/4/2011	3:03 PM	Daylight	Clear	Wet	2	N	W			79	51			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling NB on South St; MV2: traveling WB on Salem Rd. MV1 collided with MV2 when MV1 crossed the intersection without yielding for the NB Salem Rd through lane traffic, causing major front-end damage to MV1 and moderate damage to MV2.
6	11-3386-AC	2/4/2011	12:48 PM	Daylight	Clear	Wet	2	N	E			29	33			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling NB on South St; MV2: traveling EB on Salem Rd. MV1 collided with MV2 when MV1 crossed the intersection without yielding.
7	11-4809-AC	2/17/2011	4:05 PM	Daylight	Clear	Dry	2	E	N			40	39			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 while crossing the intersection without yielding for MV1, causing MV2 to collide again with a tree at the intersection.
8	11-5877-AC	2/27/2011	12:23 PM	Daylight	Clear	Wet	2	W	N			38	42			Property Damage Only	0	Angled	Visibility Obstructed	MV1: traveling WB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 due to the snow banks which obstructed the visibility of MV2 while crossing the intersection.
9	11-9799-AC	3/25/2011	11:09 AM	Daylight	Clear	Dry	2	E	N			46	27			Non-fatal Injury	2	Angled	Disregarded Traffic Controls	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 when MV2 crossed the intersection without stopping at the STOP sign, causing the operators of both MVs to be taken to the hospital.
10	11-10949-AC	4/1/2011	3:14 PM	Daylight	Clear	Dry	2	W	N			23	56			Property Damage Only	0	Angled	Disregarded Traffic Controls	MV1: traveling WB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 while crossing the intersection.
11	11-11233-AC	4/3/2011	4:11 PM	Daylight	Clear	Dry	2	N	W			50	22			Non-fatal Injury	2	Angled	Failure to Yield Right-of-Way	MV1: traveling NB on South St; MV2: traveling WB on Salem Rd. MV1 and MV2 collided when MV1 crossed the intersection without yielding for MV2, causing minor injuries to both operators.
12	11-11392-AC	4/4/2011	5:55 PM	Daylight	Cloudy	Wet	3	N	W	S		35	36	19		Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling NB on South St; MV2: traveling WB on Salem Rd; MV3: stopped at the intersection on SB South St. MV1 collided with MV2 when MV1 failed to yield for MV2. MV2 ricocheted off of MV1 and continued to travel and collided with MV3.
13	11-11936-AC	4/8/2011	4:30 PM	Daylight	Clear	Dry	2	N	W			47	68			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling NB on South St; MV2: turning left onto the SB South St from WB Salem Rd. MV1 collided with MV2 when MV1 crossed the intersection without yielding for MV2, causing minor damages to both vehicles.
14	11-13007-AC	4/15/2011	1:29 PM	Daylight	Clear	Dry	2	E	W			65	21			Property Damage Only	0	Sideswipe	Failure to Yield Right-of-Way	MV1: traveling EB on Salem Rd; MV2: traveling WB on Salem Rd. MV2 sideswiped MV1 when MV1 made a left-turn onto the EB South St without yielding for MV2.
15	11-18466-AC	5/23/2011	7:04 AM	Daylight	Rain	Wet	2	W	S			41	17			Non-fatal Injury	1	Angled	Inattention / Distracted	MV1: traveling WB on Salem Rd; MV2: traveling SB on South St. MV2 collided with MV1 while crossing the intersection without looking properly, causing damages to both vehicles.
16	11-19957-AC	6/4/2011	1:04 PM	Daylight	Clear	Dry	2	N	E			52	56			Non-fatal Injury	3	Angled	Failure to Yield Right-of-Way	MV1: traveling NB on South St; MV2: traveling EB on Salem Rd. MV1 and MV2 collided when MV1 turned right onto Salem Rd without yielding for MV2, causing damages to both cars and minor injuries to both the operators and the passenger of MV1.
17	11-21044-AC	6/12/2011	2:08 PM	Daylight	Cloudy	Wet	2	E	N			52	30			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 while crossing the intersection without yielding for MV1.
18	11-24269-AC	7/9/2011	8:52 AM	Daylight	Clear	Dry	3	W	S	N		36	30	30		Property Damage Only	0	Angled	Inattention / Distracted	MV1: traveling WB on Salem Rd; MV2: stopped at the intersection on SB South St; MV3: traveling NB on South St. MV1 collided with MV3 when MV3 failed to yield for MV1. The collision caused MV1 to continue traveling and collide with MV2 and MV3 to struck a nearby tree.

Crash Data Summary Tables  
Salem Road @ South Street - Tewksbury, MA  
01/01/2011 - 12/31/2014

Collision Diagram	Crash Number	Crash Date	Crash Time	Ambient Light	Weather Condition	Road Surface	Number of Vehicles	Vehicle Travel Directions				Operator's Age				Crash Severity	Number of Non-Fatal Injuries	Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Report)
19	11-27520-AC	8/8/2011	1:30 PM	Daylight	Cloudy	Dry	2	E	N			41	75			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 when crossing the intersection without yielding for MV1.
20	11-28247-AC	8/14/2011	3:30 PM	Daylight	Cloudy	Dry	2	E	S			53	64			Non-fatal Injury	1	Angled	Disregarded Traffic Controls	MV1: traveling EB on Salem Rd; MV2: traveling SB on South St. MV2 collided with MV1 when MV2 crossed the intersection without stopping at the STOP sign.
21	11-29114-AC	8/22/2011	9:08 PM	Dark - Lighted	Clear	Dry	2	W	N			28	49			Non-fatal Injury	1	Angled	Disregarded Traffic Controls	MV1: traveling WB on Salem Rd; MV2: traveling NB on South St. MV1 and MV2 collided when MV2 crossed the intersection without stopping at the STOP sign. MV2 was also under the influence of alcohol. Due to the collision, MV1 operator suffered minor injuries and was taken to the hospital.
22	11-30939-AC	9/8/2011	5:19 PM	Daylight	Cloudy	Dry	2	E	N			20	42			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 while crossing the intersection without yielding for MV1.
23	11-31540-AC	9/14/2011	10:00 AM	Daylight	Clear	Dry	2	S	E			82	33			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling SB on South St; MV2: traveling EB on Salem Rd. MV1 and MV2 collided when MV1 crossed the intersection without yielding for MV2, causing severe damages to both vehicles.
24	11-31764-AC	9/16/2011	7:02 PM	Daylight	Clear	Dry	2	W	N			38	33			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 while crossing the intersection without yielding for MV1.
25	11-34569-AC	10/12/2011	11:05 PM	Dark - Lighted	Rain	Wet	2	W	N			40	20			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 while crossing the intersection, causing minor damages to both vehicles.
26	11-35868-AC	10/24/2011	11:52 AM	Daylight	Clear	Dry	2	E	N			52	45			Property Damage Only	0	Angled	Visibility Obstructed	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV1 and MV2 collided when MV2 crossed the intersection while the operator's visibility was obstructed by a large bush.
27	11-36140-AC	10/27/2011	8:18 AM	Daylight	Rain	Wet	2	E	E			51	26			Property Damage Only	0	Rear-end	Inattention / Distracted	MV1 and MV2: traveling EB on Salem Road. MV2 rear-ended MV1 when MV1 slowed down to turn left onto South St.
28	12-6124-AC	2/8/2012	6:08 PM	Daylight	Clear	Dry	2	N	E			18	26			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling NB on South St; MV2: traveling EB on Salem Rd. MV1 and MV2 collided when MV1 crossed the intersection without yielding for MV2.
29	12-17037-AC	4/5/2012	6:43 AM	Daylight	Clear	Dry	2	E	N			58	41			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 while crossing the intersection without yielding for MV1.
30	12-17407-AC	4/7/2012	8:45 AM	Daylight	Clear	Dry	2	E	N			58	42			Non-fatal Injury	1	Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 when MV2 crossed the intersection without yielding, causing severe damages to both cars.
31	12-20297-AC	4/23/2012	5:14 PM	Daylight	Rain	Wet	2	S	E			58	31			Property Damage Only	0	Angled	Disregarded Traffic Controls	MV1: traveling SB on South St; MV2: traveling EB on Salem Rd. MV1 collided with MV2 when MV1 crossed the intersection without stopping at the STOP sign, causing minor damages to both vehicles.
32	12-20592-AC	4/25/2012	7:07 AM	Daylight	Clear	Dry	3	S	E	W		18	44	26		Non-fatal Injury	1	Angled	Disregarded Traffic Controls	MV1: traveling SB on South St; MV2: traveling EB on Salem Rd; MV3: traveling WB on Salem Rd. MV1 collided with MV2 when MV1 crossed the intersection without stopping at the STOP sign, causing MV2 to spin out and collide with MV3. All the vehicles were severely damaged and MV3 operator suffered some minor injuries.
33	12-21729-AC	5/1/2012	12:34 PM	Daylight	Rain	Wet	2	N	S			77	27			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling EB on South St; MV2: traveling SB on Salem Rd. MV1 collided with MV2 when MV1 crossed the intersection without stopping at the STOP sign, causing moderate damages to both vehicles.
34	12-23766-AC	5/13/2012	7:35 PM	Daylight	Clear	Dry	2	E	W			64	58			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling NB on South St; MV2: traveling WB on Salem Rd. MV1 and MV2 collided when MV1 was crossing the intersection, causing severe damages to both cars.
35	12-26592-AC	5/29/2012	1:59 PM	Daylight	Clear	Dry	2	S	E			76	51			Non-fatal Injury	1	Angled	Failure to Yield Right-of-Way	MV1: traveling SB on South St; MV2: traveling EB on Salem Rd. MV1 and MV2 collided when MV1 crossed the intersection without yielding for the WB Salem Rd traffic, causing minor injuries to the passenger in MV1.
36	12-27356-AC	6/2/2012	12:28 PM	Daylight	Rain	Wet	2	W	S			61	48			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Salem Rd; MV2: traveling SB on South St. MV2 collided with MV1 while crossing the intersection without yielding for MV1.
37	12-30759-AC	6/22/2012	2:34 PM	Daylight	Clear	Dry	2	S	E			77	29			Non-fatal Injury	1	Angled	Failure to Yield Right-of-Way	MV1: traveling SB on South St; MV2: traveling EB on Salem Rd. MV1 and MV2 collided when MV1 crossed the intersection without yielding for the EB Salem Rd traffic, causing moderate to severe damages to both vehicles.
38	12-32113-AC	6/30/2012	1:36 PM	Daylight	Clear	Dry	2	W	S			60	36			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Salem Rd; MV2: traveling SB on South St. MV2 collided with MV1 when MV2 crossed the intersection without yielding.

Crash Data Summary Tables  
Salem Road @ South Street - Tewksbury, MA  
01/01/2011 - 12/31/2014

Collision Diagram	Crash Number	Crash Date	Crash Time	Ambient Light	Weather Condition	Road Surface	Number of Vehicles	Vehicle Travel Directions				Operator's Age				Crash Severity	Number of Non-Fatal Injuries	Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Report)
	39	12-36534-AC	7/28/2012	4:41 PM	Daylight	Cloudy	2	S	W			83	78			Non-fatal Injury	2	Angled	Failure to Yield Right-of-Way	MV1: traveling SB on South St; MV2: traveling WB on Salem Rd. MV1 collided with MV2 when MV1 crossed the intersection without stopping at the STOP sign, causing heavy damages to both cars. MV2 operator and passenger were taken to the hospital.
	40	12-40131-AC	8/20/2012	2:26 PM	Daylight	Clear	2	N	W			79	44			Non-fatal Injury	3	Angled	Inattention / Distracted	MV1: traveling NB on South St; MV2: traveling WB on Salem Rd. MV1 and MV2 collided while crossing the intersection, causing minor injuries to both operators and a passenger.
	41	12-53127-AC	11/2/2012	5:50 PM	Dark - Lighted	Rain	3	N	W	S		17	17	61		Non-fatal Injury	1	Angled	Failure to Yield Right-of-Way	MV1: traveling NB on South St; MV2: traveling WB on Salem Rd; MV3: stopped at the intersection on SB South St. MV1 collided with MV2 when MV1 failed to yield for MV2. The collision caused MV2 to continue traveling and collide with MV3 and MV1 to struck nearby bushes. The collision caused severe damages to all the vehicles and MV3 operator suffered trauma from the accident.
	42	12-53416-AC	11/4/2012	6:42 PM	Dark - Lighted	Clear	2	E	N			32	70			Property Damage Only	0	Angled	Disregarded Traffic Controls	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV1 and MV2 collided when MV2 crossed the intersection without stopping at the STOP sign.
	43	12-54053-AC	11/8/2012	4:58 PM	Dusk	Rain	2	N	E			85	41			Property Damage Only	0	Angled	Disregarded Traffic Controls	MV1: traveling NB on South St; MV2: traveling EB on Salem Rd. MV1 and MV2 collided when MV1 crossed the intersection without yielding for the EB Salem Rd traffic, causing major damages to both vehicles.
	44	12-56175-AC	11/21/2012	8:41 AM	Daylight	Clear	2	S	E			48	31			Property Damage Only	0	Sideswipe	Inattention / Distracted	MV1: traveling SB on South St; MV2: traveling EB on Salem Rd. MV1 and MV2 collided while crossing the intersection.
	45	12-59175-AC	12/10/2012	12:55 PM	Daylight	Cloudy	2	N	E			31	39			Non-fatal Injury	2	Angled	Disregarded Traffic Controls	MV1: traveling NB on South St; MV2: traveling EB on Salem Rd. MV1 collided with MV2 when MV1 failed to yield for MV2. MV2 operator and her son were taken to the hospital after the collision.
	46	12-59142-AC	12/10/2012	8:54 AM	Daylight	Cloudy	2	N	W			21	60			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling NB on South St; MV2: traveling WB on Salem Rd. MV1 and MV2 collided when MV1 crossed the intersection without yielding for the WB Salem Rd traffic.
	47	12-59417-AC	12/12/2012	7:00 PM	Dark - Not Lighted	Clear	2	W	N			23	17			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 when MV2 crossed the intersection without yielding, causing moderate damage to MV1 and major damage to MV2.
	48	12-60144-AC	12/16/2012	6:28 PM	Dark - Lighted	Snow	2	N	E			72	30			Non-fatal Injury	1	Angled	Failure to Yield Right-of-Way	MV1: traveling NB on South St; MV2: traveling EB on Salem Rd. MV1 and MV2 collided when MV1 crossed the intersection without yielding for the EB Salem Rd traffic, causing minor injuries to MV1's operator.
	49	13-7514-AC	2/12/2013	8:37 AM	Daylight	Clear	2	E	N			24	30			Non-fatal Injury	1	Angled	Disregarded Traffic Controls	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 when MV2 crossed the intersection without stopping at the STOP sign.
	50	13-12540-AC	3/12/2013	2:33 PM	Daylight	Clear	3	N	E	W		17	63	52		Non-fatal Injury	3	Angled	Disregarded Traffic Controls	MV1: traveling NB on South St; MV2: traveling EB on Salem Rd; MV3: traveling WB on Salem Rd. MV1 collided with MV2 when MV1 crossed the intersection without stopping at the STOP sign, causing MV2 to spin out and collide with MV3. All the vehicles were severely damaged and the vehicle operators suffered some minor injuries.
	51	13-15862-AC	3/30/2013	8:01 AM	Daylight	Clear	2	W	N			28	54			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 while crossing the intersection.
	52	13-16704-AC	4/3/2013	5:14 PM	Daylight	Clear	2	W	N			51	29			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 while crossing the intersection without yielding for MV1.
	53	13-19856-AC	4/20/2013	12:39 PM	Daylight	Clear	2	E	N			30	40			Non-fatal Injury	2	Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 when MV2 crossed the intersection without yielding, causing moderate damages to both cars.
	54	13-20137-AC	4/22/2013	7:48 AM	Daylight	Clear	2	W	N			29	42			Non-fatal Injury	1	Angled	Inattention / Distracted	MV1: traveling WB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 while crossing the intersection, causing damages to both vehicles and MV1's operator to be taken to the hospital.
	55	13-24314-AC	5/16/2013	12:35 PM	Daylight	Clear	2	E	N			48	76			Property Damage Only	0	Angled	Inattention / Distracted	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 while crossing the intersection without yielding for MV1.
	56	13-25470-AC	5/23/2013	4:09 PM	Daylight	Clear	2	N	W			23	39			Non-fatal Injury	1	Angled	Failure to Yield Right-of-Way	MV1: traveling NB on South St; MV2: traveling WB on Salem Rd. MV1 and MV2 collided when MV1 crossed the intersection without yielding for MV2.
	57	13-43230-AC	9/15/2013	11:48 AM	Daylight	Clear	2	S	W			45	18			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling SB on South St; MV2: traveling WB on Salem Rd. When MV1 pulled out of South St, MV2 struck MV1. The collision was due to MV1's failure to yield, causing moderate damages to both vehicles.



Crash Data Summary Tables  
Salem Road @ South Street - Tewksbury, MA  
01/01/2011 - 12/31/2014

Collision Diagram	Crash Number	Crash Date	Crash Time	Ambient Light	Weather Condition	Road Surface	Number of Vehicles	Vehicle Travel Directions				Operator's Age				Crash Severity	Number of Non-Fatal Injuries	Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Report)
58	13-43761-AC	9/18/2013	10:52 AM	Daylight	Clear	Dry	2	W	S			73	28			Property Damage Only	0	Single Vehicle	Inattention / Distracted	MV1: traveling WB on Salem Rd; MV2: traveling SB on South St. MV1 struck a ditch while swerving to avoid collision with MV2, whom crossed the intersection thinking that it's a four-way stop sign intersection.
59	13-43792-AC	9/18/2013	3:52 PM	Daylight	Clear	Dry	2	N	E			35	73			Property Damage Only	0	Angled	Visibility Obstructed	MV1: traveling NB on South St; MV2: traveling EB on Salem Rd. MV1 and MV2 collided when MV1 turned right onto Salem Rd while the operator's visibility was obstructed by the sun.
60	13-44338-AC	9/21/2013	7:42 PM	Dark - Lighted	Clear	Dry	2	W	N			19	24			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Salem Rd; MV2: traveling NB on South St. MV1 and MV2 collided when MV2 failed to yield for MV1, causing moderate damages to both cars.
61	13-44274-AC	9/21/2013	12:26 PM	Daylight	Clear	Dry	3	W	W	W		37	61	18		Property Damage Only	0	Rear-end	Followed Too Closely	MV1, MV2 and MV3 are traveling WB on Salem Rd. MV3 rear-ended MV2 which caused MV2 to rear-end MV1 when MV1 stopped due to traffic, causing minor damages to all the vehicles.
62	13-49122-AC	10/20/2013	1:38 PM	Daylight	Clear	Dry	2	N	W			44	40			Property Damage Only	0	Angled	Excessive Speed	MV1: traveling NB on South St; MV2: traveling WB on Salem Rd. The collision was due to the speeding of MV2.
63	13-54721-AC	11/21/2013	8:31 AM	Daylight	Clear	Dry	2	E	N			52	42			Property Damage Only	0	Angled	Disregarded Traffic Controls	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 when MV2 crossed the intersection without stopping at the STOP sign.
64	13-54941-AC	11/22/2013	10:51 AM	Daylight	Rain	Wet	2	W	N			57	51			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 while crossing the intersection without yielding for MV1.
65	14-2601-AC	1/17/2014	8:54 AM	Daylight	Clear	Dry	2	W	S			30	50			Property Damage Only	0	Sideswipe	Failure to Yield Right-of-Way	MV1: traveling WB on Salem Rd; MV2: traveling SB on South St. MV2 sideswiped MV1 when MV2 failed to yield for MV1.
66	14-10923-AC	3/6/2014	3:57 PM	Daylight	Clear	Dry	2	E	N			39	50			Property Damage Only	0	Angled	Disregarded Traffic Controls	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 when MV2 did not stop at the stop sign. Both vehicles were towed.
67	14-13983-AC	3/24/2014	5:01 PM	Daylight	Clear	Dry	3	N	W	S		50	26	23		Property Damage Only	0	Sideswipe	Failure to Yield Right-of-Way	MV1: traveling NB on South St; MV2: traveling WB on Salem Rd; MV3: stopped at the intersection on South St SB. MV1 collided with MV2 when MV1 failed to yield for MV2. Due to the high momentum of the MV1 and MV2 impact, MV1 continued to travel and collided with MV3.
68	14-19850-AC	4/28/2014	6:19 PM	Daylight	Clear	Dry	2	N	W			20	28			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling NB on South St; MV2: traveling WB on Salem Rd. MV1 collided with MV2 when MV1 crossed the intersection without yielding, causing moderate damage to MV1 and heavy damage to MV2.
69	14-20632-AC	5/3/2014	10:51 AM	Daylight	Clear	Dry	2	E	N			42	22			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 while crossing the intersection.
70	14-22335-AC	5/13/2014	5:01 PM	Daylight	Clear	Dry	2	E	N			24	18			Property Damage Only	0	Angled	Other	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 when an unknown vehicle allowed MV2 to cross the intersection, causing damages to both vehicles.
71	14-24903-AC	5/28/2014	8:01 PM	Daylight	Clear	Dry	2	N	E			32	22			Non-fatal Injury	1	Angled	Erratic / Aggressive / Reckless Driving	MV1: traveling NB on South St; MV2: traveling EB on Salem Rd. MV1 collided with MV2 when MV1 failed to yield while crossing the intersection.
72	14-33842-AC	7/25/2014	6:50 PM	Daylight	Clear	Dry	3	W	N	S		22	33	40		Property Damage Only	0	Head-on	Failure to Yield Right-of-Way	MV1: traveling WB on Salem Rd; MV2: stopped at the intersection on NB South St; MV3: traveling SB on South St. MV1 collided with MV3 when MV3 failed to yield for MV1. The collision caused MV1 to continue traveling and collide with MV2.
73	14-35728-AC	8/7/2014	4:54 PM	Daylight	Clear	Dry	2	N	E			52	22			Property Damage Only	0	Angled	Over-Steering / Over-Correcting	MV1: stopped on NB South St; MV2: traveling EB on Salem Rd. MV1 and MV2 collided when MV2 over-steered while turning left.
74	14-38377-AC	8/26/2014	11:44 AM	Daylight	Clear	Dry	2	E	N			24	68			Non-fatal Injury	1	Angled	Disregarded Traffic Controls	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 when MV2 crossed the intersection without stopping at the STOP sign, causing MV1 to spin around into the opposite lane of travel.
75	14-47095-AC	10/23/2014	6:48 PM	Dark - Lighted	Rain	Wet	2	W	N			30				Property Damage Only	0	Angled	Disregarded Traffic Controls	MV1: traveling WB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 when MV2 crossed the intersection without stopping at the STOP sign.
76	14-51097-AC	11/17/2014	6:55 PM	Dark - Lighted	Rain	Wet	2	E	N			18	19			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 when MV2 passed a right-turning vehicle in front, causing moderate damages to both cars.
77	14-51271-AC	11/18/2014	4:18 PM	Dusk	Clear	Dry	2	W	N			56	67			Property Damage Only	0	Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 when MV2 crossed the intersection without yielding, causing moderate damage to MV2.

Crash Data Summary Tables  
Salem Road @ South Street - Tewksbury, MA  
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Collision Diagram	Crash Number	Crash Date	Crash Time	Ambient Light	Weather Condition	Road Surface	Number of Vehicles	Vehicle Travel Directions				Operator's Age				Crash Severity	Number of Non-Fatal Injuries	Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Report)
78	14-52535-AC	11/26/2014	6:08 PM	Dark - Lighted	Snow	Snow	2	N	W			39	56			Non-fatal Injury	1	Angled	Inattention / Distracted	MV1: traveling NB on South St; MV2: traveling WB on Salem Rd. MV1 collided with MV2 when MV1 crossed the intersection without yielding, causing moderate damages to both vehicles and MV2 operator was taken to the hospital.
79	14-56122-AC	12/23/2014	10:06 AM	Daylight	Rain	Wet	2	W	N			52	32			Property Damage Only	0	Other	Failure to Yield Right-of-Way	MV1: traveling WB on Salem Rd; MV2: traveling NB on South St. MV2 collided with MV1 when crossing the intersection without yielding for MV1.

**Crash Data Summary Charts**  
Salem Road @ South Street - Tewksbury, MA  
01/01/2011 - 12/31/2014

**Salem Road @ South Street**

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Month	#	%
January	5	6%
February	6	8%
March	5	6%
April	13	16%
May	9	11%
June	5	6%
July	3	4%
August	6	8%
September	8	10%
October	5	6%
November	9	11%
December	5	6%

Day of Week	#	%
Sunday	10	13%
Monday	13	16%
Tuesday	8	10%
Wednesday	12	15%
Thursday	11	14%
Friday	12	15%
Saturday	13	16%

Time of Day	#	%
6AM - 9AM	15	19%
9AM - 12PM	10	13%
12PM-3PM	18	23%
3PM - 6PM	13	16%
6PM - 9PM	21	27%
9PM - 6AM	2	3%

Manner of Collision	#	%
Single Vehicle	1	1%
Rear-end	2	3%
Angled	70	89%
Sideswipe	4	5%
Head-on	1	1%
Ped/Bike	0	0%
Other / Not Reported	1	1%

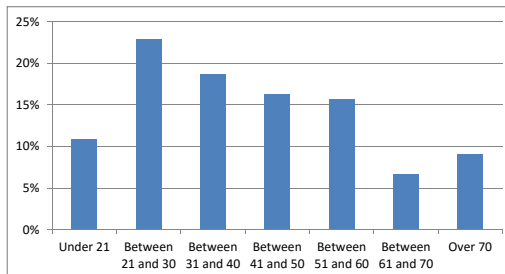
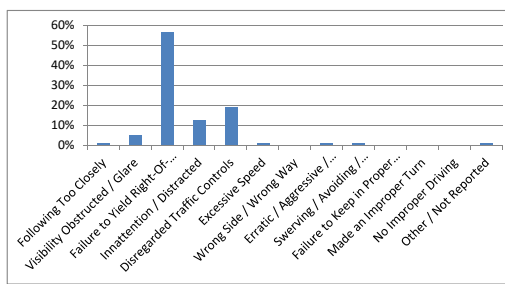
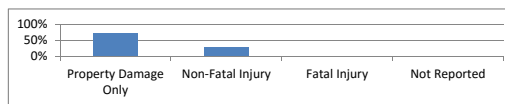
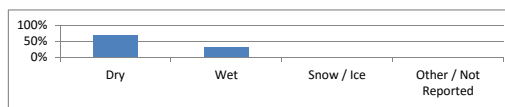
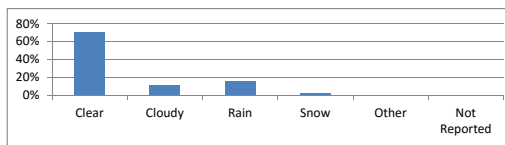
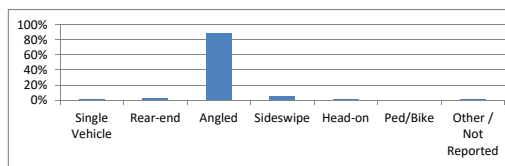
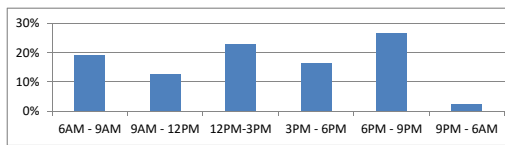
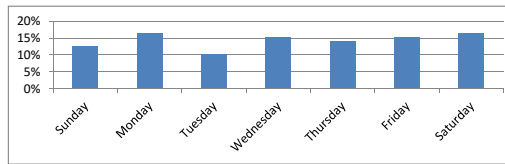
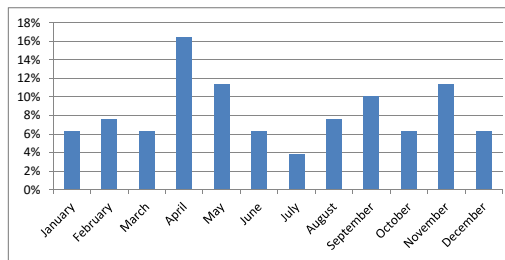
Weather Conditions	#	%
Clear	56	71%
Cloudy	9	11%
Rain	12	15%
Snow	2	3%
Other	0	0%
Not Reported	0	0%

Road Surface	#	%
Dry	53	67%
Wet	24	30%
Snow / Ice	1	1%
Other / Not Reported	1	1%

Crash Severity	#	%
Property Damage Only	56	71%
Non-Fatal Injury	23	29%
Fatal Injury	0	0%
Not Reported	0	0%

Main Contributing Factor from Narrative	#	%
Following Too Closely	1	1%
Visibility Obstructed / Glare	4	5%
Failure to Yield Right-Of-Way	45	57%
Inattention / Distracted	10	13%
Disregarded Traffic Controls	15	19%
Excessive Speed	1	1%
Wrong Side / Wrong Way	0	0%
Erratic / Aggressive / Reckless Driving	1	1%
Swerving / Avoiding / Over-Steering / Over-Correcting	1	1%
Failure to Keep in Proper Lane	0	0%
Made an Improper Turn	0	0%
No Improper Driving	0	0%
Other / Not Reported	1	1%

Age	#	%
Under 21	18	11%
Between 21 and 30	38	23%
Between 31 and 40	31	19%
Between 41 and 50	27	16%
Between 51 and 60	26	16%
Between 61 and 70	11	7%
Over 70	15	9%

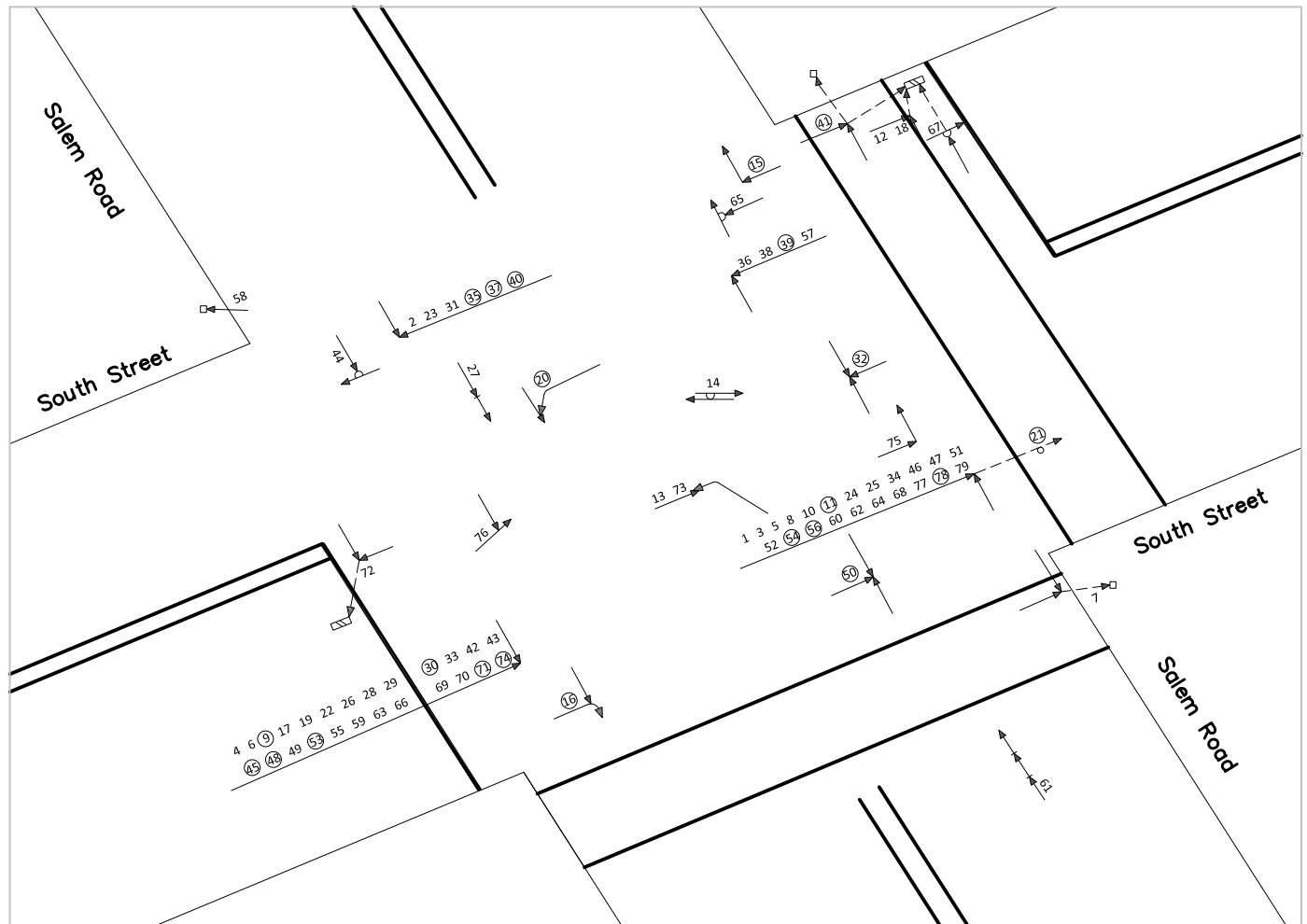




Not to Scale

# Intersection Improvements - Tewksbury, Massachusetts Road Safety Audit

LOCATION: Salem Road @ South Street  
CITY/STATE: Tewksbury, Massachusetts  
TIME PERIOD: 2011- 2014  
PREPARED BY: TEC, Inc. / Eindra (Elena) Aung, E.I.T.  
SOURCE: MassDOT / Town of Tewksbury Police Department




















LEGEND						SHOW FOR COLLISION		
	VEHICLE PATH		HEAD-ON COLLISION		FIXED OBJECT	1. Approximate location of collision, 2. Direction of collision, 3. Type of collision and vehicles involved, 4. Time, Day, Date 5. Any other pertinent factors mentioned on the report.		
	BACKING VEHICLE		ANGLED COLLISION		MOVEABLE OBJECT			
	SIDESWIPE COLLISION		FIXED OBJECT COLLISION		PARKED VEHICLE			
	PEDESTRIAN COLLISION		OVERTURNED VEHICLE		PERSONAL INJURY			
	CYCLIST COLLISION		OUT-OF-CONTROL VEHICLE		FATALITY			
	REAR-END COLLISION				ANIMAL			
SUMMARY OF CRASHES ON DIAGRAM <i>[no fatal collisions]</i>								
	REAR-END	SIDESWIPE	HEAD-ON	ANGLED	SINGLE VEH	PED/BIKE	OTHER / UNK	TOTAL
PROPERTY DAMAGE ONLY	2	4	1	47	1	0	1	56
NON-FATAL INJURY	0	0	0	23	0	0	0	23
UNKNOWN / NOT REPORTED	0	0	0	0	0	0	0	0
TOTAL	2	4	1	70	1	0	1	79

Figure RSA-3

Collision Diagram  
2011-2014 Collision Data



TEC, Inc.  
65 Glenn Street | 169 Ocean Blvd, Unit 101  
Lawrence, MA 01843 | Hampton, NH 03842  
(978) 794.1792 | (603) 601.8154  
www.TheEngineeringCorp.com

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Tewksbury COUNT DATE : Jul-16

DISTRICT : 4 UNSIGNALIZED : ☒ **YES** SIGNALIZED : ☐ **NO**

### ~ INTERSECTION DATA ~

MAJOR STREET : Salem Road

MINOR STREET(S) : South Street

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (PM) :	488	785	418	119		1,810

"K" FACTOR :

**0.100**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**18,073**

TOTAL # OF CRASHES :

79

# OF YEARS :

4

AVERAGE # OF CRASHES PER YEAR ( A ) :

**19.75**

**CRASH RATE CALCULATION :**

**2.99**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : Peak Hour Volumes based on ATR counts

Project Title & Date : Intersection Improvements - Tewksbury, MA

## Appendix D. Additional Information

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THE COMMONWEALTH OF MASSACHUSETTS  
HIGHWAY DEPARTMENT  
TOWN OF TEWKSBURY  
SPECIAL SPEED REGULATION #617-A

93 APR 14 AM 10:24

Highway Location: TEWKSBURY  
Authority In Control: TOWN OF TEWKSBURY  
Name of Highway (s): SALEM ROAD

In accordance with the provisions of Chapter 90, Section 18, of the General Laws (Ter. Ed.) as amended, the following Special Speed Regulation is

Hereby Adopted  
by the Board of Selectmen  
of the Town of Tewksbury

That the following speed limits are established at which motor vehicles may be operated in the areas described:

Special Speed Regulation Number 617, dated April 27, 1971, is hereby amended by striking out all clauses pertaining to Salem Road and inserting in place the following:

That the following speed limits are established at which motor vehicles may be operated in the areas described.

SALEM ROAD - EASTBOUND

Beginning at a point 500 feet east of the junction of Route 38, thence easterly on Salem Road;

0.51 miles at 30 miles per hour ending at the Wilmington Town Line; the total distance being 0.51 miles.

SALEM ROAD - WESTBOUND

Beginning at the Wilmington Town Line, thence westerly on Salem Road;

0.61 miles at 30 miles per hour ending at the junction of Route 38; the total distance being 0.61 miles.

Operation of a motor vehicle at a rate of speed in excess of these limits shall be prima facie evidence that such speed is greater than is reasonable and proper.

The provisions of this regulation shall not, however, abrogate in any sense Chapter 90, Section 14, of the General Laws (Ter. Ed.).

Date of Passage May 5, 1998

[Signature]  
[Signature]

Charles E. Cardwell  
[Signature]  
[Signature]  
BOARD OF SELECTMEN

Attest Elizabeth A. Carey  
TOWN CLERK

COMMONWEALTH OF MASSACHUSETTS  
HIGHWAY DEPARTMENT

SPECIAL SPEED REGULATION NO. 617-A

58 APR 14 AM 10:24

The Highway Department and the Registry of Motor Vehicles, acting jointly, do hereby certify that this regulation is consistent with the public interest.

Standard signs must be erected at the beginning of each zone.

DATE: 7/29/98

FOR THE HIGHWAY DEPARTMENT

BY: [Signature]  
Traffic Engineer

FOR THE REGISTRY OF MOTOR VEHICLES

BY: Robert P. McHonnell  
Chief Deputy Registrar

Sullivan  
JUN 03 1977

TOWN OF TEWKSBURY  
SPECIAL SPEED REGULATION NO. 3044

Highway Location: TEWKSBURY  
Authority In Control: TOWN OF TEWKSBURY  
Name of Highway: South Street ✓  
North Street ✓

In accordance with the provisions of Chapter 90, Section 18, of the General Laws (Ter. Ed.) as amended, the following Special Speed Regulation is

hereby Adopted

by the Board of Selectmen  
of the Town of Tewksbury

That the following speed limits are established at which motor vehicles may be operated in the areas described:

SOUTH STREET - NORTHBOUND

Beginning at the Wilmington Town Line  
Thence northerly on South Street

2.93 miles at 25 miles per hour ending at Moonlight Drive; the total distance being 2.93 miles.

SOUTH STREET - SOUTHBOUND

Beginning at Moonlight Drive  
Thence southerly on South Street

2.93 miles at 25 miles per hour ending at the Wilmington Town Line; the total distance being 2.93 miles.

NORTH STREET - NORTHBOUND

Beginning at Route 38  
Thence northerly on North Street

0.10 miles at 25 miles per hour  
0.75 " " 30 " " "  
1.56 " " 35 " " " ending at Route 133; the total distance being 2.41 miles.

NORTH STREET - SOUTHBOUND

Beginning 200 feet south of Route 133  
Thence southerly on North Street

1.52 miles at 35 miles per hour  
0.75 " " 30 " " "  
0.10 " " 25 " " " ending at Route 38; the total distance being 2.37 miles.

Operation of a motor vehicle at a rate of speed in excess of these limits shall be prima facie evidence that such speed is greater than is reasonable and proper.

The provisions of this regulation shall not, however, abrogate in any sense Chapter 90, Section 14, of the General Laws (Ter. Ed).

Date of Passage

*Joseph M. Muel*  
*William D. Halliday*

Board of Selectmen

Attest

*John S. Leduc*  
 Town Clerk

COMMONWEALTH OF MASSACHUSETTS  
 DEPARTMENT OF PUBLIC WORKS

SPECIAL SPEED REGULATION NO. 3044

The Department of Public Works and the Registrar of Motor Vehicles, acting jointly, do hereby certify that this regulation is consistent with the public interests.

Standard signs must be erected at the beginning of each zone.

DATE: JUN 03 1977

FOR THE DEPARTMENT OF PUBLIC WORKS

BY:

*V. Cantone*  
 Traffic Engineer

*E. Rhoades Gennaro*  
 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
 Acting Registrar of Motor  
 Vehicles

South Street  
north of Salem Rd.  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio  
NB

165178 B Speed  
Site Code: T0655

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
07/21/ 16	1	0	3	14	2	1	0	0	0	0	0	0	0	21	28	26
01:00	0	0	1	1	4	2	0	0	0	0	0	0	0	8	36	31
02:00	0	0	0	2	0	0	0	0	0	0	0	0	0	2	28	27
03:00	0	0	2	2	1	0	0	0	0	0	0	0	0	5	30	26
04:00	0	1	1	4	2	0	0	0	0	0	0	0	0	8	31	26
05:00	0	0	3	13	7	1	1	0	0	0	0	0	0	25	32	29
06:00	0	0	3	21	24	2	1	0	0	0	0	0	0	51	33	30
07:00	0	0	6	22	28	5	0	0	0	0	0	0	0	61	33	30
08:00	1	0	4	36	45	5	0	0	0	0	0	0	0	91	33	30
09:00	0	2	8	31	24	2	0	0	0	0	0	0	0	67	32	28
10:00	1	2	11	43	25	6	0	0	0	0	0	0	0	88	32	28
11:00	0	0	13	40	35	8	0	0	0	0	0	0	0	96	33	29
12 PM	1	2	8	43	44	9	0	0	0	0	0	0	0	107	33	29
13:00	0	1	8	44	33	6	1	0	0	0	0	0	0	93	32	29
14:00	1	1	10	74	61	13	0	0	0	0	0	0	0	160	33	29
15:00	0	0	8	70	126	22	3	0	0	0	0	0	0	229	33	31
16:00	0	1	14	95	174	30	3	1	0	0	0	1	0	319	33	31
17:00	0	0	7	124	197	40	4	0	0	0	0	0	0	372	33	31
18:00	0	0	8	108	133	20	4	1	0	0	0	0	0	274	33	30
19:00	0	0	6	65	63	6	2	0	0	0	0	0	0	142	32	30
20:00	0	1	11	54	35	3	2	0	0	0	0	0	0	106	32	29
21:00	0	0	7	41	24	5	0	0	0	0	0	0	0	77	32	29
22:00	0	1	10	33	15	2	0	0	0	0	0	0	0	61	31	28
23:00	0	0	4	23	8	0	0	0	0	0	0	0	0	35	30	28
Total	5	12	156	1003	1110	188	21	2	0	0	0	1	0	2498		
%	0.2%	0.5%	6.2%	40.2%	44.4%	7.5%	0.8%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	00:00	09:00	11:00	10:00	08:00	11:00	05:00							11:00		
Vol.	1	2	13	43	45	8	1							96		
PM Peak	12:00	12:00	16:00	17:00	17:00	17:00	17:00	16:00				16:00		17:00		
Vol.	1	2	14	124	197	40	4	1				1		372		

Stats

15th Percentile :	25 MPH
50th Percentile :	29 MPH
85th Percentile :	33 MPH
95th Percentile :	36 MPH
Mean Speed(Average) :	30 MPH
10 MPH Pace Speed :	25-34 MPH
Number in Pace :	2113
Percent in Pace :	84.6%
Number of Vehicles > 30 MPH :	1100
Percent of Vehicles > 30 MPH :	44.0%

South Street  
north of Salem Rd.  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio  
NB

165178 B Speed  
Site Code: T0655

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
07/22/																
16	0	0	3	6	8	2	0	0	0	0	0	0	0	19	33	29
01:00	0	0	0	2	7	0	0	0	0	0	0	0	0	9	33	31
02:00	0	0	1	1	0	0	0	0	0	0	0	0	0	2	27	25
03:00	0	0	1	1	0	0	0	0	0	0	0	0	0	2	27	25
04:00	0	0	0	5	1	0	0	0	0	0	0	0	0	6	29	28
05:00	0	0	3	7	7	2	0	0	0	0	0	0	0	19	33	29
06:00	0	0	2	23	13	2	0	0	0	0	0	0	0	40	32	29
07:00	0	0	7	35	30	2	0	0	0	0	0	0	0	74	32	29
08:00	0	1	8	26	37	5	1	0	0	0	0	0	0	78	33	30
09:00	2	2	18	27	22	3	0	0	0	0	0	0	0	74	32	27
10:00	1	1	10	40	33	1	0	0	0	0	0	0	0	86	32	28
11:00	0	1	3	59	49	11	0	0	0	0	0	0	0	123	33	30
12 PM	1	2	8	40	59	13	1	0	0	0	0	0	0	124	33	30
13:00	0	0	11	56	50	11	1	0	0	0	0	0	0	129	33	29
14:00	0	1	9	73	95	19	1	1	0	0	0	0	0	199	33	30
15:00	1	2	19	86	106	32	2	1	0	0	0	0	0	249	33	30
16:00	0	3	17	127	136	26	2	0	0	0	0	1	0	312	33	30
17:00	0	2	6	112	166	42	3	0	0	0	0	0	0	331	33	31
18:00	0	2	5	77	92	16	1	0	0	0	0	0	0	193	33	30
19:00	0	1	10	58	48	11	0	0	0	0	0	0	0	128	33	29
20:00	0	1	4	42	32	4	1	1	0	0	0	0	0	85	32	29
21:00	0	0	11	35	25	2	0	0	0	0	0	0	0	73	32	28
22:00	1	1	7	34	15	5	0	1	0	0	0	0	0	64	32	28
23:00	0	0	6	24	16	1	0	0	0	0	0	0	0	47	32	28
Total	6	20	169	996	1047	210	13	4	0	0	0	1	0	2466		
%	0.2%	0.8%	6.9%	40.4%	42.5%	8.5%	0.5%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	09:00	09:00	09:00	11:00	11:00	11:00	08:00							11:00		
Vol.	2	2	18	59	49	11	1							123		
PM Peak	12:00	16:00	15:00	16:00	17:00	17:00	17:00	14:00				16:00		17:00		
Vol.	1	3	19	127	166	42	3	1				1		331		

Stats

15th Percentile :	24 MPH
50th Percentile :	29 MPH
85th Percentile :	33 MPH
95th Percentile :	36 MPH
Mean Speed(Average) :	30 MPH
10 MPH Pace Speed :	25-34 MPH
Number in Pace :	2043
Percent in Pace :	82.8%
Number of Vehicles > 30 MPH :	1066
Percent of Vehicles > 30 MPH :	43.2%

South Street  
north of Salem Rd.  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio  
NB

165178 B Speed  
Site Code: T0655

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
07/23/ 16	0	0	0	10	9	0	1	0	0	0	0	0	0	20	32	30
01:00	0	0	3	5	5	1	0	0	0	0	0	0	0	14	32	28
02:00	0	0	1	5	3	0	0	0	0	0	0	0	0	9	31	28
03:00	0	0	0	3	2	0	0	0	0	0	0	0	0	5	32	29
04:00	0	0	1	0	1	0	0	0	0	0	0	0	0	2	32	27
05:00	0	0	2	1	4	1	0	0	0	0	0	0	0	8	33	30
06:00	0	0	6	10	8	1	0	0	0	0	0	0	0	25	32	28
07:00	0	0	8	18	18	3	0	0	0	0	0	0	0	47	32	29
08:00	0	0	11	27	36	5	2	0	0	0	0	0	0	81	33	30
09:00	0	1	9	40	41	3	0	0	0	0	0	0	0	94	32	29
10:00	0	0	6	52	53	7	0	0	0	0	0	0	0	118	32	30
11:00	1	2	7	43	50	13	0	0	0	0	0	0	0	116	33	30
12 PM	0	1	13	55	55	10	0	0	0	0	0	0	0	134	33	29
13:00	0	1	8	48	73	6	3	0	0	0	0	0	0	139	33	30
14:00	0	0	6	64	60	9	2	0	0	0	0	0	0	141	33	30
15:00	0	0	9	47	62	8	1	0	0	0	0	0	0	127	33	30
16:00	0	0	6	45	71	10	1	0	0	0	0	0	0	133	33	30
17:00	0	2	10	42	47	4	0	0	0	0	0	0	0	105	32	29
18:00	0	0	5	44	48	8	1	1	0	0	0	0	0	107	33	30
19:00	0	0	1	34	34	9	3	0	0	0	0	0	0	81	33	31
20:00	0	4	11	32	21	6	1	0	0	0	0	0	0	75	32	28
21:00	0	3	9	38	13	1	1	0	0	0	0	0	0	65	31	27
22:00	0	1	3	29	15	1	0	0	0	0	0	0	0	49	31	28
23:00	0	0	5	15	9	3	0	0	0	0	0	0	0	32	33	29
Total	1	15	140	707	738	109	16	1	0	0	0	0	0	1727		
%	0.1%	0.9%	8.1%	40.9%	42.7%	6.3%	0.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	11:00	11:00	08:00	10:00	10:00	11:00	08:00							10:00		
Vol.	1	2	11	52	53	13	2							118		
PM Peak		20:00	12:00	14:00	13:00	12:00	13:00	18:00						14:00		
Vol.		4	13	64	73	10	3	1						141		

Stats

15th Percentile :	24 MPH
50th Percentile :	29 MPH
85th Percentile :	33 MPH
95th Percentile :	35 MPH
Mean Speed(Average) :	29 MPH
10 MPH Pace Speed :	25-34 MPH
Number in Pace :	1445
Percent in Pace :	83.7%
Number of Vehicles > 30 MPH :	716
Percent of Vehicles > 30 MPH :	41.5%



South Street  
north of Salem Rd.  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio  
SB

165178 B Speed  
Site Code: T0655

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
07/21/ 16	0	0	0	0	7	1	1	0	0	0	0	0	0	9	37	34
01:00	0	0	1	3	1	0	0	0	0	0	0	0	0	5	30	27
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
03:00	0	0	1	1	1	1	1	0	0	0	0	0	0	5	40	32
04:00	0	0	0	1	9	2	2	0	0	0	0	0	0	14	38	34
05:00	1	3	14	38	31	7	1	0	0	0	0	0	0	95	32	28
06:00	0	2	14	63	84	14	0	0	0	0	0	0	0	177	33	30
07:00	0	0	13	80	89	7	1	0	0	0	0	0	0	190	32	29
08:00	1	2	14	54	74	13	0	0	0	0	0	0	0	158	33	29
09:00	1	2	7	33	58	10	2	0	0	0	0	0	0	113	33	30
10:00	3	2	8	36	44	10	0	0	0	0	0	0	0	103	33	29
11:00	0	0	3	29	48	8	0	0	0	0	0	0	0	88	33	30
12 PM	0	2	8	34	34	10	0	0	0	0	0	0	0	88	33	29
13:00	1	0	4	22	36	4	0	0	0	0	0	0	0	67	33	30
14:00	0	0	11	32	29	14	0	0	0	0	0	0	0	86	34	30
15:00	0	0	4	28	51	13	0	0	0	0	0	0	0	96	33	31
16:00	0	0	3	29	48	11	0	0	0	0	0	0	0	91	33	31
17:00	1	0	7	48	51	3	0	0	0	0	0	0	0	110	32	29
18:00	0	0	4	53	50	10	0	0	0	0	0	0	0	117	33	30
19:00	0	0	8	26	34	4	2	0	0	0	0	0	0	74	33	30
20:00	0	1	2	22	30	3	0	0	0	0	0	0	0	58	33	30
21:00	0	0	0	24	19	3	0	0	0	0	0	0	0	46	32	30
22:00	0	0	1	15	18	4	1	0	0	0	0	0	0	39	33	31
23:00	0	0	0	8	8	2	0	0	0	0	0	0	0	18	33	30
Total	8	14	127	679	854	154	11	0	0	0	0	0	0	1847		
%	0.4%	0.8%	6.9%	36.8%	46.2%	8.3%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	10:00	05:00	05:00	07:00	07:00	06:00	04:00							07:00		
Vol.	3	3	14	80	89	14	2							190		
PM Peak	13:00	12:00	14:00	18:00	15:00	14:00	19:00							18:00		
Vol.	1	2	11	53	51	14	2							117		

Stats

15th Percentile :	24 MPH
50th Percentile :	29 MPH
85th Percentile :	33 MPH
95th Percentile :	36 MPH
Mean Speed(Average) :	30 MPH
10 MPH Pace Speed :	25-34 MPH
Number in Pace :	1533
Percent in Pace :	83.0%
Number of Vehicles > 30 MPH :	848
Percent of Vehicles > 30 MPH :	45.9%

South Street  
north of Salem Rd.  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio  
SB

165178 B Speed  
Site Code: T0655

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
07/22/ 16	0	0	0	1	3	0	1	0	0	0	0	0	0	5	40	33
01:00	0	0	1	2	3	0	0	0	0	0	0	0	0	6	32	29
02:00	0	0	0	1	0	0	0	0	0	0	0	0	0	1	28	27
03:00	0	0	1	2	3	1	0	0	0	0	0	0	0	7	33	30
04:00	0	0	0	4	8	2	0	0	0	0	0	0	0	14	33	31
05:00	1	2	4	29	29	6	0	0	0	0	0	0	0	71	33	29
06:00	0	1	6	<b>70</b>	<b>71</b>	<b>9</b>	0	0	0	0	0	0	0	157	32	30
07:00	0	0	<b>23</b>	69	58	8	1	0	0	0	0	0	0	<b>159</b>	32	29
08:00	0	3	6	42	69	8	<b>2</b>	0	0	0	0	0	0	130	33	30
09:00	<b>11</b>	<b>12</b>	12	36	35	0	0	0	0	0	0	0	0	106	31	25
10:00	0	6	13	39	39	7	0	0	0	0	0	0	0	104	32	28
11:00	0	1	7	30	58	5	1	0	0	0	0	0	0	102	33	30
12 PM	0	0	3	32	32	9	<b>2</b>	0	0	0	0	0	0	78	33	30
13:00	0	1	6	32	43	6	1	0	0	0	0	0	0	89	33	30
14:00	0	0	9	38	48	<b>14</b>	0	0	0	0	0	0	0	109	33	30
15:00	2	3	2	29	57	11	0	0	0	0	0	0	0	104	33	30
16:00	<b>4</b>	<b>14</b>	<b>20</b>	39	28	3	0	0	0	0	0	0	0	108	31	26
17:00	0	2	3	29	49	10	1	0	0	0	0	0	0	94	33	30
18:00	0	0	7	<b>40</b>	<b>64</b>	7	1	0	0	0	0	0	0	<b>119</b>	33	30
19:00	0	0	6	34	29	7	1	0	0	0	0	0	0	77	33	30
20:00	0	0	6	23	29	4	1	0	0	0	0	0	0	63	33	30
21:00	0	0	4	15	18	7	0	0	0	0	0	0	0	44	34	30
22:00	0	0	3	16	15	2	1	0	0	0	0	0	0	37	33	30
23:00	0	1	2	9	17	1	0	0	0	0	0	0	0	30	32	29
Total	18	46	144	661	805	127	13	0	0	0	0	0	0	1814		
%	1.0%	2.5%	7.9%	36.4%	44.4%	7.0%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	09:00	09:00	07:00	06:00	06:00	06:00	08:00							07:00		
Vol.	11	12	23	70	71	9	2							159		
PM Peak	16:00	16:00	16:00	18:00	18:00	14:00	12:00							18:00		
Vol.	4	14	20	40	64	14	2							119		

Stats

15th Percentile : 24 MPH  
50th Percentile : 29 MPH  
85th Percentile : 33 MPH  
95th Percentile : 35 MPH

Mean Speed(Average) : 29 MPH  
10 MPH Pace Speed : 25-34 MPH  
Number in Pace : 1466  
Percent in Pace : 80.8%  
Number of Vehicles > 30 MPH : 784  
Percent of Vehicles > 30 MPH : 43.2%

South Street  
north of Salem Rd.  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio  
SB

165178 B Speed  
Site Code: T0655

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
07/23/ 16	0	0	0	2	5	2	0	0	0	0	0	0	0	9	35	32
01:00	0	0	0	1	4	1	0	0	0	0	0	0	0	6	34	32
02:00	0	0	1	2	1	2	0	0	0	0	0	0	0	6	36	30
03:00	0	0	0	2	2	0	0	0	0	0	0	0	0	4	32	30
04:00	0	0	0	0	3	0	0	0	0	0	0	0	0	3	33	32
05:00	2	0	1	6	11	4	0	0	0	0	0	0	0	24	34	29
06:00	0	0	2	10	27	7	0	0	0	0	0	0	0	46	34	31
07:00	0	0	2	26	31	8	1	0	0	0	0	0	0	68	33	31
08:00	2	1	5	32	43	9	2	1	0	0	0	0	0	95	33	30
09:00	1	2	6	42	65	13	0	0	0	0	0	0	0	129	33	30
10:00	1	2	18	34	54	10	1	0	0	0	0	0	0	120	33	29
11:00	1	0	3	47	64	9	0	0	0	0	0	0	0	124	33	30
12 PM	0	1	4	41	66	4	1	0	0	0	0	0	0	117	33	30
13:00	0	0	7	35	47	11	1	0	0	0	0	0	0	101	33	30
14:00	0	0	4	36	72	13	1	0	0	0	0	0	0	126	33	31
15:00	0	0	7	26	50	11	2	0	0	0	0	0	0	96	33	31
16:00	0	1	3	26	47	6	1	0	0	0	0	0	0	84	33	30
17:00	0	0	8	38	47	6	0	0	0	0	0	0	0	99	33	30
18:00	0	0	6	28	51	8	1	0	0	0	0	0	0	94	33	30
19:00	0	1	4	24	33	9	1	0	0	0	0	0	0	72	33	30
20:00	1	1	6	25	31	6	1	0	0	0	0	0	0	71	33	29
21:00	0	1	3	11	19	9	2	0	0	0	0	0	0	45	36	31
22:00	0	1	1	22	22	3	1	0	0	0	0	0	0	50	33	30
23:00	0	0	0	5	17	4	1	0	0	0	0	0	0	27	35	32
Total	8	11	91	521	812	155	17	1	0	0	0	0	0	1616		
%	0.5%	0.7%	5.6%	32.2%	50.2%	9.6%	1.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	05:00	09:00	10:00	11:00	09:00	09:00	08:00	08:00						09:00		
Vol.	2	2	18	47	65	13	2	1						129		
PM Peak	20:00	12:00	17:00	12:00	14:00	14:00	15:00							14:00		
Vol.	1	1	8	41	72	13	2							126		

Stats

15th Percentile :	25 MPH
50th Percentile :	30 MPH
85th Percentile :	33 MPH
95th Percentile :	36 MPH
Mean Speed(Average) :	30 MPH
10 MPH Pace Speed :	25-34 MPH
Number in Pace :	1333
Percent in Pace :	82.5%
Number of Vehicles > 30 MPH :	823
Percent of Vehicles > 30 MPH :	50.9%

South Street  
north of Salem Rd.  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio

165178 B Volume  
Site Code: T0655

Start	NB				SB				Combin ed		7/21/201 6 Thu	
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.	
12:00	6		31		3		18		9		49	
12:15	6		29		2		19		8		48	
12:30	6		20		2		32		8		52	
12:45	3	21	27	107	2	9	19	88	5	30	46	195
01:00	2		29		3		17		5		46	
01:15	2		22		1		18		3		40	
01:30	2		21		1		19		3		40	
01:45	2	8	21	93	0	5	13	67	2	13	34	160
02:00	0		34		0		12		0		46	
02:15	2		45		0		30		2		75	
02:30	0		38		0		22		0		60	
02:45	0	2	43	160	0	0	22	86	0	2	65	246
03:00	1		53		0		25		1		78	
03:15	1		56		0		22		1		78	
03:30	2		51		3		24		5		75	
03:45	1	5	69	229	2	5	25	96	3	10	94	325
04:00	1		69		3		22		4		91	
04:15	2		79		0		21		2		100	
04:30	2		89		4		20		6		109	
04:45	3	8	82	319	7	14	28	91	10	22	110	410
05:00	3		97		11		30		14		127	
05:15	3		93		16		25		19		118	
05:30	7		81		42		31		49		112	
05:45	12	25	101	372	26	95	24	110	38	120	125	482
06:00	7		78		43		28		50		106	
06:15	9		88		38		35		47		123	
06:30	14		56		49		32		63		88	
06:45	21	51	52	274	47	177	22	117	68	228	74	391
07:00	15		49		42		25		57		74	
07:15	12		31		48		11		60		42	
07:30	13		36		55		18		68		54	
07:45	21	61	26	142	45	190	20	74	66	251	46	216
08:00	22		32		46		13		68		45	
08:15	20		25		47		16		67		41	
08:30	28		27		36		20		64		47	
08:45	21	91	22	106	29	158	9	58	50	249	31	164
09:00	23		21		23		15		46		36	
09:15	13		25		30		12		43		37	
09:30	13		14		32		15		45		29	
09:45	18	67	17	77	28	113	4	46	46	180	21	123
10:00	11		14		24		17		35		31	
10:15	33		16		29		8		62		24	
10:30	21		14		27		4		48		18	
10:45	23	88	17	61	23	103	10	39	46	191	27	100
11:00	28		9		22		4		50		13	
11:15	34		9		25		6		59		15	
11:30	19		10		19		2		38		12	
11:45	15	96	7	35	22	88	6	18	37	184	13	53
Total	523		1975		957		890		1480		2865	
Percent	35.3%		68.9%		64.7%		31.1%					
Day Total			2498				1847				4345	
Peak	10:30	-	05:00	-	07:15	-	05:45	-	07:30	-	05:00	-
Vol.	106	-	372	-	194	-	119	-	269	-	482	-
P.H.F.	0.779		0.921		0.882		0.850		0.989		0.949	

South Street  
north of Salem Rd.  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio

165178 B Volume  
Site Code: T0655

Start	NB		SB		Combin		ed		7/22/201	
Time	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	6	Fri
12:00	8	33	1	21	9	54				
12:15	2	22	1	16	3	38				
12:30	6	32	3	19	9	51				
12:45	3	37	0	5	3	59	24	202		
01:00	1	32	2	28	3	60				
01:15	3	31	1	28	4	59				
01:30	2	32	1	22	3	54				
01:45	3	34	2	6	5	45	15	218		
02:00	0	50	1	26	1	76				
02:15	1	44	0	27	1	71				
02:30	1	54	0	27	1	81				
02:45	0	51	0	1	0	80	3	308		
03:00	1	50	0	18	1	68				
03:15	1	55	0	22	1	77				
03:30	0	64	2	30	2	94				
03:45	0	80	5	7	5	114	9	353		
04:00	1	73	2	28	3	101				
04:15	1	77	2	21	3	98				
04:30	1	81	3	25	4	106				
04:45	3	81	7	14	10	115	20	420		
05:00	6	94	6	16	12	110				
05:15	1	80	14	30	15	110				
05:30	6	87	34	22	40	109				
05:45	6	70	17	71	23	96	90	425		
06:00	7	54	36	37	43	91				
06:15	6	54	41	15	47	69				
06:30	14	43	39	36	53	79				
06:45	13	42	41	157	31	73	197	312		
07:00	15	34	41	28	56	62				
07:15	26	36	31	18	57	54				
07:30	13	29	42	14	55	43				
07:45	20	29	45	159	17	46	233	205		
08:00	13	25	37	16	50	41				
08:15	29	18	33	14	62	32				
08:30	20	21	28	18	48	39				
08:45	16	21	32	130	15	36	208	148		
09:00	23	19	31	20	54	39				
09:15	14	25	25	12	39	37				
09:30	21	17	22	7	43	24				
09:45	16	12	28	106	5	17	180	117		
10:00	26	14	34	11	60	25				
10:15	13	25	18	9	31	34				
10:30	27	14	26	10	53	24				
10:45	20	11	26	104	7	18	190	101		
11:00	28	17	19	9	47	26				
11:15	31	8	27	7	58	15				
11:30	40	11	28	8	68	19				
11:45	24	11	28	102	6	17	225	77		
Total	532	1934	862	952	1394	2886				
Percent	38.2%	67.0%	61.8%	33.0%						
Day Total		2466		1814		4280				
Peak	11:00	-	04:45	-	06:15	-	06:00	-	07:00	-
Vol.	123	-	342	-	162	-	119	-	233	-
P.H.F.	0.769	-	0.910	-	0.988	-	0.804	-	0.896	-

South Street  
north of Salem Rd.  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio

165178 B Volume  
Site Code: T0655

Start	NB		SB		Combin		ed		7/23/201	
Time	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	6	Sat
12:00	9	27	2	28	11	55				
12:15	2	31	3	32	5	63				
12:30	4	41	2	23	6	64				
12:45	5	35	2	34	7	69	29	251		
01:00	4	31	2	26	6	57				
01:15	5	43	3	18	8	61				
01:30	2	29	0	26	2	55				
01:45	3	36	1	31	4	67	20	240		
02:00	3	40	0	27	3	67				
02:15	2	40	5	25	7	65				
02:30	2	30	1	30	3	60				
02:45	2	31	0	44	2	75	15	267		
03:00	2	28	0	26	2	54				
03:15	0	39	3	27	3	66				
03:30	3	27	1	22	4	49				
03:45	0	33	0	21	0	54	9	223		
04:00	0	32	0	18	0	50				
04:15	0	31	2	24	2	55				
04:30	1	34	1	17	2	51				
04:45	1	36	0	25	1	61	5	217		
05:00	1	34	2	33	3	67				
05:15	3	17	8	29	11	46				
05:30	1	28	5	18	6	46				
05:45	3	26	9	19	12	45	32	204		
06:00	7	26	9	30	16	56				
06:15	4	21	11	24	15	45				
06:30	8	29	12	23	20	52				
06:45	6	31	14	17	20	48	71	201		
07:00	13	19	16	15	29	34				
07:15	10	15	15	18	25	33				
07:30	11	26	16	20	27	46				
07:45	13	21	21	19	34	40	115	153		
08:00	16	20	27	16	43	36				
08:15	23	17	21	17	44	34				
08:30	22	19	26	22	48	41				
08:45	20	19	21	16	41	35	176	146		
09:00	24	18	32	10	56	28				
09:15	22	17	28	12	50	29				
09:30	27	13	34	14	61	27				
09:45	21	17	35	9	56	26	223	110		
10:00	28	11	34	14	62	25				
10:15	33	11	27	17	60	28				
10:30	24	17	42	13	66	30				
10:45	33	10	17	6	50	16	238	99		
11:00	24	8	30	9	54	17				
11:15	34	10	35	4	69	14				
11:30	27	6	28	10	55	16				
11:45	31	8	31	4	62	12	240	59		
Total	539	1188	634	982	1173	2170				
Percent	46.0%	54.7%	54.0%	45.3%						
Day Total		1727		1616		3343				
Peak	10:00	-	00:30	-	09:45	-	02:00	-	-	-
Vol.	118	-	150	-	138	-	267	-	-	-
P.H.F.	0.894	-	0.872	-	0.821	-	0.890	-	-	-

Salem Road  
just west of Oakland Avenue  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio

165178 C Speed  
Site Code: T0655

EB	Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
	07/21/ 16	0	0	0	5	12	10	2	1	0	0	0	0	0	30	38	34
	01:00	0	0	0	1	6	1	0	0	0	0	0	0	0	8	33	32
	02:00	0	0	0	2	4	3	1	0	0	0	0	0	0	10	38	34
	03:00	0	0	0	2	9	11	5	1	0	0	0	0	0	28	40	36
	04:00	0	0	0	3	16	29	12	3	0	0	1	0	0	64	41	37
	05:00	0	0	3	12	103	136	41	1	2	0	0	0	0	298	38	36
	06:00	0	0	0	18	120	196	42	4	0	0	0	0	0	380	38	36
	07:00	2	1	1	27	187	264	43	3	0	0	0	0	0	528	38	35
	08:00	0	1	1	29	156	194	40	3	1	1	0	0	1	427	38	35
	09:00	0	1	1	21	113	136	13	2	0	0	0	0	0	287	37	34
	10:00	0	1	3	25	108	105	21	2	0	0	0	0	0	265	38	34
	11:00	1	1	1	15	99	104	20	4	0	0	0	0	0	245	38	35
	12 PM	4	1	1	25	122	127	24	2	0	0	0	0	0	306	38	34
	13:00	0	4	0	13	116	129	15	2	1	0	0	0	0	280	38	35
	14:00	1	0	0	6	108	112	35	1	1	0	0	0	0	264	38	35
	15:00	3	4	1	23	102	125	29	3	2	0	0	0	0	292	38	35
	16:00	5	1	9	36	171	137	22	4	0	0	0	0	0	385	37	33
	17:00	8	12	36	49	177	148	25	5	0	0	0	0	0	460	37	32
	18:00	3	7	5	45	206	113	24	2	0	0	0	0	0	405	37	33
	19:00	2	2	1	23	87	95	16	2	0	1	0	0	0	229	38	34
	20:00	2	0	2	25	109	82	13	0	0	0	0	0	0	233	37	33
	21:00	0	1	0	26	90	53	12	1	0	1	0	0	0	184	37	34
	22:00	1	4	0	7	38	47	9	2	1	0	0	0	0	109	38	34
	23:00	1	0	0	5	28	16	2	3	1	0	0	0	0	56	38	34
	Total	33	41	65	443	2287	2373	466	51	9	3	1	0	1	5773		
	%	0.6%	0.7%	1.1%	7.7%	39.6%	41.1%	8.1%	0.9%	0.2%	0.1%	0.0%	0.0%	0.0%			
	AM Peak	07:00	07:00	05:00	08:00	07:00	07:00	07:00	06:00	05:00	08:00	04:00		08:00	07:00		
	Vol.	2	1	3	29	187	264	43	4	2	1	1		1	528		
	PM Peak	17:00	17:00	17:00	17:00	18:00	17:00	14:00	17:00	15:00	19:00				17:00		
	Vol.	8	12	36	49	206	148	35	5	2	1				460		

Stats

15th Percentile :	29 MPH
50th Percentile :	34 MPH
85th Percentile :	38 MPH
95th Percentile :	41 MPH
Mean Speed(Average) :	34 MPH
10 MPH Pace Speed :	30-39 MPH
Number in Pace :	4660
Percent in Pace :	80.7%
Number of Vehicles > 35 MPH :	2429
Percent of Vehicles > 35 MPH :	42.1%



Salem Road  
just west of Oakland Avenue  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio

165178 C Speed  
Site Code: T0655

Start	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th	Ave
Time	14	19	24	29	34	39	44	49	54	59	64	69	9999		% ile	Speed
07/22/																
16	0	0	0	3	8	12	2	1	0	0	0	0	0	26	38	35
01:00	2	0	1	2	8	8	0	0	0	0	0	0	0	21	37	31
02:00	0	0	0	0	5	4	1	1	0	0	0	0	0	11	40	36
03:00	0	0	0	3	6	10	1	1	0	0	0	0	0	21	38	35
04:00	0	0	0	4	22	22	7	3	2	0	0	0	0	60	41	36
05:00	0	1	1	10	78	132	44	5	1	0	0	0	0	272	40	36
06:00	0	0	1	13	121	175	40	1	1	0	0	0	0	352	38	36
07:00	0	2	0	10	187	272	42	2	0	0	0	0	0	515	38	35
08:00	4	8	27	40	121	170	39	0	1	0	1	0	0	411	38	33
09:00	2	1	1	36	130	97	8	2	0	0	0	0	0	277	37	33
10:00	11	7	14	45	115	59	6	0	0	0	0	0	0	257	36	31
11:00	4	5	2	24	111	115	15	0	0	0	0	0	0	276	37	33
12 PM	0	4	2	22	105	130	26	5	1	0	0	0	0	295	38	35
13:00	3	3	7	23	143	120	24	1	0	0	0	0	0	324	38	34
14:00	2	4	6	27	122	144	25	4	0	0	0	0	0	334	38	34
15:00	1	1	7	19	142	153	41	0	0	0	0	0	0	364	38	35
16:00	3	5	11	45	194	146	30	6	0	0	0	0	0	440	37	33
17:00	4	3	23	35	169	146	29	5	2	1	0	0	0	417	38	33
18:00	4	1	2	35	172	121	20	2	2	0	0	0	0	359	37	34
19:00	2	7	2	10	96	82	24	2	0	0	0	0	0	225	38	34
20:00	3	3	0	23	87	76	16	1	0	0	0	0	0	209	38	34
21:00	2	3	3	16	77	50	10	2	0	0	0	0	0	163	37	33
22:00	0	1	2	11	47	37	10	2	0	0	0	0	0	110	38	34
23:00	2	0	0	5	24	33	6	1	0	0	0	0	0	71	38	34
Total	49	59	112	461	2290	2314	466	47	10	1	1	0	0	5810		
%	0.8%	1.0%	1.9%	7.9%	39.4%	39.8%	8.0%	0.8%	0.2%	0.0%	0.0%	0.0%	0.0%			
AM Peak	10:00	08:00	08:00	10:00	07:00	07:00	05:00	05:00	04:00		08:00			07:00		
Vol.	11	8	27	45	187	272	44	5	2		1			515		
PM Peak	17:00	19:00	17:00	16:00	16:00	15:00	15:00	16:00	17:00	17:00				16:00		
Vol.	4	7	23	45	194	153	41	6	2	1				440		

Stats

15th Percentile :	29 MPH
50th Percentile :	33 MPH
85th Percentile :	38 MPH
95th Percentile :	41 MPH
Mean Speed(Average) :	34 MPH
10 MPH Pace Speed :	30-39 MPH
Number in Pace :	4604
Percent in Pace :	79.2%
Number of Vehicles > 35 MPH :	2376
Percent of Vehicles > 35 MPH :	40.9%

Salem Road  
just west of Oakland Avenue  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio

165178 C Speed  
Site Code: T0655

EB	Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed			
07/23/ 16	0	0	0	3	21	25	2	0	1	0	0	0	0	0	52	38	35			
01:00	0	1	0	4	16	8	2	1	0	0	0	0	0	0	32	37	33			
02:00	0	0	1	3	6	7	0	0	0	0	0	0	0	0	17	37	33			
03:00	0	0	0	0	3	5	3	1	0	0	0	0	0	0	12	42	38			
04:00	0	0	0	0	5	13	4	2	0	0	0	0	0	0	24	41	38			
05:00	0	0	0	0	23	36	9	1	1	0	0	0	0	0	70	39	36			
06:00	0	0	1	2	41	48	16	2	0	0	0	0	0	0	110	39	36			
07:00	1	1	0	5	51	90	23	4	0	0	0	0	0	0	175	39	36			
08:00	2	1	1	8	69	117	33	1	0	0	0	0	0	0	232	38	36			
09:00	1	4	3	8	97	133	21	5	1	0	0	0	0	0	273	38	35			
10:00	5	6	0	13	106	145	15	3	0	0	0	0	0	0	293	38	34			
11:00	2	4	3	14	99	130	27	1	0	0	0	0	0	0	280	38	35			
12 PM	4	11	6	19	110	144	22	0	0	0	0	0	0	0	316	38	34			
13:00	6	9	5	25	120	102	30	4	0	0	0	0	0	0	301	38	33			
14:00	2	3	1	20	112	138	27	2	1	0	0	0	0	0	306	38	35			
15:00	3	4	0	13	105	108	32	4	0	0	0	0	0	0	269	38	35			
16:00	3	2	6	15	104	102	29	3	0	0	0	0	0	0	264	38	34			
17:00	2	6	2	17	88	111	16	2	0	0	0	0	0	0	244	38	34			
18:00	5	2	1	14	92	110	21	5	0	0	0	0	0	0	250	38	34			
19:00	0	4	4	7	69	74	19	0	2	0	0	0	0	0	179	38	35			
20:00	0	0	1	19	60	43	11	0	1	1	0	0	0	0	136	38	34			
21:00	0	0	1	13	62	39	11	3	0	0	0	0	0	0	129	38	34			
22:00	0	0	0	7	36	38	8	0	0	0	0	0	0	0	89	38	35			
23:00	2	1	0	10	38	21	5	0	0	0	0	0	0	0	77	37	33			
Total %	38 0.9%	59 1.4%	36 0.9%	239 5.8%	1533 37.1%	1787 43.3%	386 9.3%	44 1.1%	7 0.2%	1 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	4130					
AM Peak	10:00	10:00	09:00	11:00	10:00	10:00	08:00	09:00	00:00									10:00		
Vol.	5	6	3	14	106	145	33	5	1									293		
PM Peak	13:00	12:00	12:00	13:00	13:00	12:00	15:00	18:00	19:00	20:00							12:00			
Vol.	6	11	6	25	120	144	32	5	2	1							316			

Stats

15th Percentile :	29 MPH
50th Percentile :	34 MPH
85th Percentile :	38 MPH
95th Percentile :	41 MPH
Mean Speed(Average) :	34 MPH
10 MPH Pace Speed :	30-39 MPH
Number in Pace :	3320
Percent in Pace :	80.4%
Number of Vehicles > 35 MPH :	1868
Percent of Vehicles > 35 MPH :	45.2%

Salem Road  
just west of Oakland Avenue  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio  
WB

165178 C Speed  
Site Code: T0655

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
07/21/ 16	0	0	0	6	26	20	1	1	0	0	0	0	0	54	37	34
01:00	0	0	0	2	6	7	0	0	0	0	0	0	0	15	37	34
02:00	0	0	1	1	4	3	1	1	0	0	0	0	0	11	40	34
03:00	0	0	0	2	5	2	0	0	0	0	0	0	0	9	35	32
04:00	0	0	0	3	4	8	2	0	1	0	0	0	0	18	39	36
05:00	1	0	0	6	19	18	1	1	0	0	0	0	0	46	37	33
06:00	0	1	0	11	66	47	5	0	0	0	0	0	0	130	37	34
07:00	2	3	2	26	155	80	3	0	0	0	0	0	0	271	36	33
08:00	1	2	5	51	167	50	2	0	0	0	0	0	0	278	35	32
09:00	3	0	1	35	132	71	1	0	0	0	0	0	0	243	36	32
10:00	5	1	2	29	130	85	6	1	0	0	0	0	0	259	37	33
11:00	2	1	0	11	150	76	8	0	0	0	0	0	0	248	37	33
12 PM	0	4	7	34	192	101	7	0	0	0	0	0	0	345	36	33
13:00	2	1	4	36	144	96	5	1	0	0	0	0	0	289	37	33
14:00	3	4	7	57	265	114	10	0	0	0	0	0	0	460	36	32
15:00	9	4	11	126	320	98	8	0	0	0	0	0	0	576	34	31
16:00	37	35	64	197	281	86	2	0	0	0	0	0	0	702	33	28
17:00	103	57	75	168	257	54	4	0	0	0	0	0	0	718	33	26
18:00	7	14	43	138	273	50	3	0	0	0	0	0	0	528	33	30
19:00	1	1	1	65	214	65	3	1	0	0	0	0	0	351	35	32
20:00	3	0	10	55	159	46	0	0	0	0	0	0	0	273	34	31
21:00	0	0	1	34	131	32	0	0	0	0	0	0	0	198	34	32
22:00	0	2	0	26	93	25	2	1	0	0	0	0	0	149	35	32
23:00	0	0	0	3	56	31	5	2	0	1	0	0	0	98	37	34
Total %	179 2.9%	130 2.1%	234 3.7%	1122 17.9%	3249 51.8%	1265 20.2%	79 1.3%	9 0.1%	1 0.0%	1 0.0%	0 0.0%	0 0.0%	0 0.0%	6269		
AM Peak	10:00	07:00	08:00	08:00	08:00	10:00	11:00	00:00	04:00					08:00		
Vol.	5	3	5	51	167	85	8	1	1					278		
PM Peak	17:00	17:00	17:00	16:00	15:00	14:00	14:00	23:00		23:00				17:00		
Vol.	103	57	75	197	320	114	10	2		1				718		

Stats

15th Percentile : 25 MPH  
50th Percentile : 31 MPH  
85th Percentile : 35 MPH  
95th Percentile : 38 MPH

Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 30-39 MPH  
Number in Pace : 4514  
Percent in Pace : 72.0%  
Number of Vehicles > 35 MPH : 1102  
Percent of Vehicles > 35 MPH : 17.6%

Salem Road  
just west of Oakland Avenue  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio  
WB

165178 C Speed  
Site Code: T0655

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
07/22/																
16	1	0	0	4	18	12	0	0	0	0	0	0	0	35	36	32
01:00	1	0	0	1	6	8	0	0	0	0	0	0	0	16	37	33
02:00	0	0	0	0	6	2	0	0	0	0	0	0	0	8	36	33
03:00	0	0	0	1	6	1	1	1	0	0	0	0	0	10	41	35
04:00	0	0	0	2	13	4	1	0	0	0	0	0	0	20	36	33
05:00	1	1	0	8	27	18	0	0	0	0	0	0	0	55	36	32
06:00	2	0	1	8	71	46	4	1	0	0	0	0	0	133	37	33
07:00	1	1	0	19	149	76	1	0	0	0	0	0	0	247	36	33
08:00	4	3	22	64	146	52	1	0	0	0	0	0	0	292	34	31
09:00	9	1	14	55	101	36	8	0	0	0	0	0	0	224	35	30
10:00	17	8	19	43	101	35	5	0	0	0	0	0	0	228	34	29
11:00	4	0	3	52	181	74	5	0	0	0	0	0	0	319	36	32
12 PM	1	1	3	32	177	123	5	0	0	0	0	0	0	342	37	33
13:00	5	4	2	75	184	68	3	0	0	0	0	0	0	341	35	31
14:00	5	7	15	96	263	103	7	1	0	0	0	0	0	497	35	31
15:00	13	11	24	87	333	94	4	0	0	0	0	0	0	566	34	31
16:00	17	29	63	209	330	75	3	0	0	0	0	0	0	726	33	29
17:00	51	52	80	140	259	60	5	0	0	0	0	0	0	647	33	27
18:00	3	3	5	72	215	94	6	0	0	0	0	0	0	398	36	32
19:00	3	2	5	43	165	60	2	0	0	0	0	0	0	280	35	32
20:00	1	2	0	46	127	43	2	0	0	0	0	0	0	221	35	32
21:00	0	1	0	41	89	34	3	0	0	0	0	0	0	168	35	32
22:00	0	0	1	17	75	29	5	0	0	0	0	0	0	127	36	33
23:00	1	0	2	17	50	32	0	0	0	0	0	0	0	102	36	32
Total	140	126	259	1132	3092	1179	71	3	0	0	0	0	0	6002		
%	2.3%	2.1%	4.3%	18.9%	51.5%	19.6%	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	10:00	10:00	08:00	08:00	11:00	07:00	09:00	03:00						11:00		
Vol.	17	8	22	64	181	76	8	1						319		
PM Peak	17:00	17:00	17:00	16:00	15:00	12:00	14:00	14:00						16:00		
Vol.	51	52	80	209	333	123	7	1						726		

Stats

15th Percentile :	25 MPH
50th Percentile :	31 MPH
85th Percentile :	35 MPH
95th Percentile :	38 MPH
Mean Speed(Average) :	31 MPH
10 MPH Pace Speed :	30-39 MPH
Number in Pace :	4271
Percent in Pace :	71.2%
Number of Vehicles > 35 MPH :	1017
Percent of Vehicles > 35 MPH :	16.9%

Salem Road  
just west of Oakland Avenue  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio  
WB

165178 C Speed  
Site Code: T0655

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
07/23/ 16	0	0	0	14	28	17	1	0	0	0	0	0	0	60	36	32
01:00	0	0	0	6	12	9	3	0	0	0	0	0	0	30	38	34
02:00	0	0	0	4	9	6	1	1	0	0	0	0	0	21	38	34
03:00	0	0	0	0	4	3	2	0	0	0	0	0	0	9	40	36
04:00	0	0	0	2	7	2	0	0	0	0	0	0	0	11	34	32
05:00	0	0	0	1	7	15	0	0	0	0	0	0	0	23	37	35
06:00	0	0	0	5	30	20	1	2	0	0	0	0	0	58	37	34
07:00	4	0	3	14	59	44	3	0	0	0	0	0	0	127	37	32
08:00	4	1	0	19	100	74	7	1	0	0	0	0	0	206	37	33
09:00	3	2	6	27	98	71	9	0	0	0	0	0	0	216	37	33
10:00	5	1	6	43	171	59	3	0	0	0	0	0	0	288	35	32
11:00	2	2	3	29	181	89	6	0	0	0	0	0	0	312	36	33
12 PM	1	0	6	27	154	82	10	0	0	0	0	0	0	280	37	33
13:00	7	2	1	32	170	60	2	0	0	0	0	0	0	274	35	32
14:00	5	0	0	37	172	84	5	0	0	0	0	0	0	303	36	33
15:00	4	1	6	37	188	73	4	0	0	0	0	0	0	313	36	32
16:00	0	1	0	32	144	76	6	0	0	0	0	0	0	259	36	33
17:00	1	2	2	26	147	83	7	0	0	0	0	0	0	268	36	33
18:00	5	0	2	30	155	42	2	0	0	0	0	0	0	236	35	32
19:00	0	2	5	30	140	56	4	0	0	0	0	0	0	237	36	32
20:00	0	2	6	53	97	37	1	1	0	1	0	0	0	198	35	31
21:00	3	0	3	30	85	28	1	1	0	0	0	0	0	151	35	31
22:00	0	1	1	11	70	22	1	0	0	0	0	0	0	106	35	32
23:00	1	0	1	19	45	16	1	1	0	0	0	0	0	84	35	32
Total	45	17	51	528	2273	1068	80	7	0	1	0	0	0	4070		
%	1.1%	0.4%	1.3%	13.0%	55.8%	26.2%	2.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	10:00	09:00	09:00	10:00	11:00	11:00	09:00	06:00						11:00		
Vol.	5	2	6	43	181	89	9	2						312		
PM Peak	13:00	13:00	12:00	20:00	15:00	14:00	12:00	20:00		20:00				15:00		
Vol.	7	2	6	53	188	84	10	1		1				313		

Stats

15th Percentile :	28 MPH
50th Percentile :	32 MPH
85th Percentile :	36 MPH
95th Percentile :	38 MPH
Mean Speed(Average) :	32 MPH
10 MPH Pace Speed :	30-39 MPH
Number in Pace :	3341
Percent in Pace :	82.1%
Number of Vehicles > 35 MPH :	942
Percent of Vehicles > 35 MPH :	23.2%

Salem Road  
just west of Oakland Avenue  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio

165178 C Volume  
Site Code: T0655

Start	EB		WB		Combin		ed		7/21/201	
Time	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	6	Thu
12:00	16	62	20	86	36	148				
12:15	3	72	15	92	18	164				
12:30	5	92	14	77	19	169				
12:45	6	80	5	90	11	170	84	651		
01:00	2	76	5	60	7	136				
01:15	2	63	7	80	9	143				
01:30	4	73	1	68	5	141				
01:45	0	68	2	81	2	149	23	569		
02:00	2	54	3	84	5	138				
02:15	4	83	2	97	6	180				
02:30	4	63	3	126	7	189				
02:45	0	64	3	153	3	217	21	724		
03:00	6	69	3	153	9	222				
03:15	4	63	1	132	5	195				
03:30	7	80	4	146	11	226				
03:45	11	80	1	145	12	225	37	868		
04:00	7	84	2	163	9	247				
04:15	10	90	2	176	12	266				
04:30	18	121	6	170	24	291				
04:45	29	90	8	193	37	283	82	1087		
05:00	37	125	13	203	50	328				
05:15	84	85	4	219	88	304				
05:30	94	126	15	157	109	283				
05:45	83	124	14	139	97	263	344	1178		
06:00	85	122	21	157	106	279				
06:15	78	116	24	154	102	270				
06:30	99	84	48	101	147	185				
06:45	118	83	37	116	155	199	510	933		
07:00	123	67	50	101	173	168				
07:15	129	49	59	93	188	142				
07:30	150	57	72	85	222	142				
07:45	126	56	90	72	216	128	799	580		
08:00	119	60	66	69	185	129				
08:15	113	54	75	73	188	127				
08:30	102	61	82	74	184	135				
08:45	93	58	55	57	148	115	705	506		
09:00	79	58	64	56	143	114				
09:15	68	43	62	61	130	104				
09:30	56	42	58	48	114	90				
09:45	84	41	59	33	143	74	530	382		
10:00	69	42	58	50	127	92				
10:15	68	23	61	38	129	61				
10:30	61	22	73	30	134	52				
10:45	67	22	67	31	134	53	524	258		
11:00	62	14	55	26	117	40				
11:15	60	10	56	30	116	40				
11:30	59	18	67	28	126	46				
11:45	64	14	70	14	134	28	493	154		
Total	2570	3203	1582	4687	4152	7890				
Percent	61.9%	40.6%	38.1%	59.4%						
Day Total		5773		6269		12042				
Peak	07:00	-	05:30	-	07:45	-	04:30	-	-	-
Vol.	528	-	488	-	313	-	785	-	1206	-
P.H.F.	0.880	-	0.968	-	0.869	-	0.896	-	0.913	-

Salem Road  
just west of Oakland Avenue  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio

165178 C Volume  
Site Code: T0655

Start	EB				WB				Combin		ed		7/22/201	
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		6	
														Fri
12:00	5		68		12		87		17		155			
12:15	8		81		6		80		14		161			
12:30	9		72		13		75		22		147			
12:45	4	26	74	295	4	35	100	342	8	61	174	637		
01:00	5		96		5		87		10		183			
01:15	8		78		4		73		12		151			
01:30	6		75		5		84		11		159			
01:45	2	21	75	324	2	16	97	341	4	37	172	665		
02:00	1		68		1		112		2		180			
02:15	4		89		1		110		5		199			
02:30	2		84		3		154		5		238			
02:45	4	11	93	334	3	8	121	497	7	19	214	831		
03:00	4		85		2		128		6		213			
03:15	5		84		3		126		8		210			
03:30	4		97		3		148		7		245			
03:45	8	21	98	364	2	10	164	566	10	31	262	930		
04:00	9		95		3		181		12		276			
04:15	10		121		3		180		13		301			
04:30	18		89		6		171		24		260			
04:45	23	60	135	440	8	20	194	726	31	80	329	1166		
05:00	41		117		9		201		50		318			
05:15	55		86		16		189		71		275			
05:30	90		118		9		133		99		251			
05:45	86	272	96	417	21	55	124	647	107	327	220	1064		
06:00	69		95		18		133		87		228			
06:15	81		103		30		88		111		191			
06:30	106		75		44		105		150		180			
06:45	96	352	86	359	41	133	72	398	137	485	158	757		
07:00	113		60		56		79		169		139			
07:15	127		56		54		64		181		120			
07:30	141		51		58		73		199		124			
07:45	134	515	58	225	79	247	64	280	213	762	122	505		
08:00	113		43		63		60		176		103			
08:15	104		70		76		60		180		130			
08:30	97		55		78		57		175		112			
08:45	97	411	41	209	75	292	44	221	172	703	85	430		
09:00	69		37		50		44		119		81			
09:15	68		47		53		38		121		85			
09:30	73		44		56		49		129		93			
09:45	67	277	35	163	65	224	37	168	132	501	72	331		
10:00	71		30		54		36		125		66			
10:15	70		29		48		37		118		66			
10:30	59		24		71		23		130		47			
10:45	57	257	27	110	55	228	31	127	112	485	58	237		
11:00	65		23		64		24		129		47			
11:15	74		15		77		25		151		40			
11:30	71		19		96		31		167		50			
11:45	66	276	14	71	82	319	22	102	148	595	36	173		
Total	2499		3311		1587		4415		4086		7726			
Percent	61.2%		42.9%		38.8%		57.1%							
Day Total			5810				6002				11812			
Peak	07:00	-	04:15	-	11:00	-	04:30	-	07:15	-	04:15	-	-	-
Vol.	515	-	462	-	319	-	755	-	769	-	1208	-	-	-
P.H.F.	0.913		0.856		0.831		0.939		0.903		0.918			

Salem Road  
just west of Oakland Avenue  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio

165178 C Volume  
Site Code: T0655

Start	EB				WB				Combin		ed		7/23/2016 Sat	
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.			
12:00	17		82		22		57		39		139			
12:15	13		92		14		68		27		160			
12:30	12		76		10		86		22		162			
12:45	10	52	66	316	14	60	69	280	24	112	135	596		
01:00	11		74		10		68		21		142			
01:15	8		74		7		78		15		152			
01:30	5		82		5		69		10		151			
01:45	8	32	71	301	8	30	59	274	16	62	130	575		
02:00	4		77		6		74		10		151			
02:15	4		83		4		67		8		150			
02:30	5		72		5		76		10		148			
02:45	4	17	74	306	6	21	86	303	10	38	160	609		
03:00	3		85		1		65		4		150			
03:15	2		67		3		87		5		154			
03:30	3		60		5		77		8		137			
03:45	4	12	57	269	0	9	84	313	4	21	141	582		
04:00	2		64		0		63		2		127			
04:15	8		66		4		63		12		129			
04:30	8		70		3		70		11		140			
04:45	6	24	64	264	4	11	63	259	10	35	127	523		
05:00	8		74		5		56		13		130			
05:15	18		57		6		59		24		116			
05:30	24		55		7		76		31		131			
05:45	20	70	58	244	5	23	77	268	25	93	135	512		
06:00	20		65		3		61		23		126			
06:15	26		68		11		55		37		123			
06:30	33		70		15		63		48		133			
06:45	31	110	47	250	29	58	57	236	60	168	104	486		
07:00	43		65		22		64		65		129			
07:15	41		40		39		62		80		102			
07:30	45		33		30		68		75		101			
07:45	46	175	41	179	36	127	43	237	82	302	84	416		
08:00	52		35		47		62		99		97			
08:15	66		35		50		51		116		86			
08:30	52		33		45		43		97		76			
08:45	62	232	33	136	64	206	42	198	126	438	75	334		
09:00	62		48		42		44		104		92			
09:15	61		25		63		33		124		58			
09:30	79		29		52		31		131		60			
09:45	71	273	27	129	59	216	43	151	130	489	70	280		
10:00	75		22		71		31		146		53			
10:15	73		25		57		25		130		50			
10:30	82		24		69		24		151		48			
10:45	63	293	18	89	91	288	26	106	154	581	44	195		
11:00	81		23		78		19		159		42			
11:15	69		20		70		25		139		45			
11:30	61		15		85		24		146		39			
11:45	69	280	19	77	79	312	16	84	148	592	35	161		
Total	1570		2560		1361		2709		2931		5269			
Percent	53.6%		48.6%		46.4%		51.4%							
Day Total			4130				4070				8200			
Peak	09:45	-	12:00	-	10:45	-	02:45	-	10:30	-	02:30	-	-	-
Vol.	301	-	316	-	324	-	315	-	603	-	612	-	-	-
P.H.F.	0.918		0.859		0.890		0.905		0.948		0.956			



South Street  
north of Main Street  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio  
NB

165178 D Speed  
Site Code: T0655

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
07/21/ 16	0	2	4	13	1	0	0	0	0	0	0	0	0	20	28	25
01:00	1	1	4	8	0	0	0	0	0	0	0	0	0	14	27	23
02:00	0	0	4	0	1	0	0	0	0	0	0	0	0	5	30	24
03:00	0	0	5	4	2	0	0	0	0	0	0	0	0	11	29	26
04:00	0	0	7	8	2	0	0	0	0	0	0	0	0	17	28	26
05:00	1	8	34	36	8	0	0	0	0	0	0	0	0	87	28	24
06:00	6	12	71	51	<b>10</b>	0	0	0	0	0	0	0	0	150	27	23
07:00	<b>9</b>	<b>34</b>	103	65	6	0	0	0	0	0	0	0	0	<b>217</b>	26	22
08:00	0	31	<b>108</b>	<b>66</b>	6	0	0	0	0	0	0	0	0	211	27	23
09:00	4	14	50	54	3	<b>1</b>	0	0	0	0	0	0	0	126	27	23
10:00	0	11	68	51	5	0	0	0	0	0	0	0	0	135	27	24
11:00	3	13	60	60	4	0	0	0	0	0	0	0	0	140	27	24
12 PM	10	12	79	<b>70</b>	<b>11</b>	0	0	0	0	0	0	0	0	182	27	23
13:00	6	9	65	67	8	0	0	0	0	0	0	0	0	155	27	24
14:00	10	27	82	68	5	0	0	0	0	0	0	0	0	192	27	23
15:00	4	39	114	70	11	0	0	0	0	0	0	0	0	238	27	23
16:00	73	<b>61</b>	149	42	3	0	0	0	0	0	0	0	0	328	23	19
17:00	<b>123</b>	46	<b>214</b>	23	1	0	0	0	0	0	0	0	0	<b>407</b>	23	17
18:00	59	60	150	64	6	0	0	0	0	0	0	0	0	339	25	20
19:00	0	4	81	53	3	0	0	0	0	0	0	0	0	141	27	24
20:00	2	17	65	48	4	0	0	0	0	0	0	0	0	136	27	23
21:00	5	19	56	27	2	0	0	0	0	0	0	0	0	109	26	22
22:00	0	11	28	25	3	0	0	0	0	0	0	0	0	67	27	23
23:00	0	3	15	11	1	0	0	0	0	0	0	0	0	30	27	24
Total	316	434	1616	984	106	1	0	0	0	0	0	0	0	3457		
%	9.1%	12.6%	46.7%	28.5%	3.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	07:00	07:00	08:00	08:00	06:00	09:00								07:00		
Vol.	9	34	108	66	10	1								217		
PM Peak	17:00	16:00	17:00	12:00	12:00									17:00		
Vol.	123	61	214	70	11									407		

Stats

15th Percentile : 16 MPH  
50th Percentile : 22 MPH  
85th Percentile : 26 MPH  
95th Percentile : 28 MPH

Mean Speed(Average) : 22 MPH  
10 MPH Pace Speed : 20-29 MPH  
Number in Pace : 2600  
Percent in Pace : 75.2%  
Number of Vehicles > 30 MPH : 86  
Percent of Vehicles > 30 MPH : 2.5%

South Street  
north of Main Street  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio  
NB

165178 D Speed  
Site Code: T0655

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
07/22/ 16	0	1	3	4	2	0	0	0	0	0	0	0	0	10	30	26
01:00	1	1	6	5	1	0	0	0	0	0	0	0	0	14	27	23
02:00	0	0	1	2	0	0	0	0	0	0	0	0	0	3	27	25
03:00	0	0	3	4	2	0	0	0	0	0	0	0	0	9	30	26
04:00	0	0	7	8	1	0	0	0	0	0	0	0	0	16	28	25
05:00	0	8	23	39	4	0	0	0	0	0	0	0	0	74	28	25
06:00	0	11	56	55	<b>10</b>	0	0	0	0	0	0	0	0	132	28	24
07:00	<b>13</b>	23	<b>105</b>	<b>64</b>	5	0	0	0	0	0	0	0	0	<b>210</b>	26	22
08:00	2	<b>29</b>	91	60	5	<b>1</b>	0	0	0	0	0	0	0	188	27	23
09:00	7	23	61	45	5	0	0	0	0	0	0	0	0	141	27	22
10:00	11	26	65	32	2	0	0	0	0	0	0	0	0	136	26	21
11:00	5	19	84	63	3	0	0	0	0	0	0	0	0	174	27	23
12 PM	2	23	83	<b>73</b>	8	0	0	0	0	0	0	0	0	189	27	24
13:00	5	19	88	73	6	<b>1</b>	0	0	0	0	0	0	0	192	27	23
14:00	16	29	106	68	<b>13</b>	0	0	0	0	0	0	0	0	232	27	22
15:00	25	47	118	70	8	0	0	0	0	0	0	0	0	268	26	21
16:00	69	<b>62</b>	168	46	1	0	0	0	0	0	0	0	0	346	23	19
17:00	<b>74</b>	56	<b>169</b>	47	4	0	0	0	0	0	0	0	0	<b>350</b>	23	19
18:00	32	49	132	59	4	0	0	0	0	0	0	0	0	276	25	21
19:00	0	19	74	51	8	1	0	0	0	0	0	0	0	153	27	24
20:00	2	21	50	40	3	0	0	0	0	0	0	0	0	116	27	23
21:00	1	19	54	19	4	0	0	0	0	0	0	0	0	97	26	22
22:00	0	5	31	37	6	0	0	0	0	0	0	0	0	79	28	25
23:00	1	3	25	22	1	0	0	0	0	0	0	0	0	52	27	24
Total	266	493	1603	986	106	3	0	0	0	0	0	0	0	3457		
%	7.7%	14.3%	46.4%	28.5%	3.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	07:00	08:00	07:00	07:00	06:00	08:00								07:00		
Vol.	13	29	105	64	10	1								210		
PM Peak	17:00	16:00	17:00	12:00	14:00	13:00								17:00		
Vol.	74	62	169	73	13	1								350		

Stats

15th Percentile :	16 MPH
50th Percentile :	22 MPH
85th Percentile :	26 MPH
95th Percentile :	28 MPH
Mean Speed(Average) :	22 MPH
10 MPH Pace Speed :	20-29 MPH
Number in Pace :	2589
Percent in Pace :	74.9%
Number of Vehicles > 30 MPH :	88
Percent of Vehicles > 30 MPH :	2.5%

South Street  
north of Main Street  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio  
NB

165178 D Speed  
Site Code: T0655

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
07/23/ 16	0	0	10	11	2	1	0	0	0	0	0	0	0	24	28	26
01:00	0	4	13	11	1	0	0	0	0	0	0	0	0	29	27	24
02:00	3	1	6	3	1	0	0	0	0	0	0	0	0	14	27	20
03:00	0	0	3	2	0	0	0	0	0	0	0	0	0	5	27	24
04:00	0	0	4	2	1	0	0	0	0	0	0	0	0	7	28	25
05:00	0	1	11	12	2	0	0	0	0	0	0	0	0	26	28	25
06:00	0	0	17	15	3	0	0	0	0	0	0	0	0	35	28	25
07:00	1	8	38	35	6	0	0	0	0	0	0	0	0	88	27	24
08:00	0	11	40	45	5	0	0	0	0	0	0	0	0	101	27	24
09:00	0	10	64	66	10	0	0	0	0	0	0	0	0	150	28	25
10:00	1	16	68	66	6	0	0	0	0	0	0	0	0	157	27	24
11:00	2	18	83	63	2	0	0	0	0	0	0	0	0	168	27	23
12 PM	5	21	79	74	7	0	0	0	0	0	0	0	0	186	27	23
13:00	1	14	86	73	3	1	0	0	0	0	0	0	0	178	27	24
14:00	2	15	83	70	9	0	0	0	0	0	0	0	1	180	27	24
15:00	1	12	86	72	10	0	0	0	0	0	0	0	0	181	27	24
16:00	8	21	67	77	2	0	0	0	0	0	0	0	0	175	27	23
17:00	3	14	52	60	13	0	0	0	0	0	0	0	0	142	28	24
18:00	0	14	68	63	5	1	0	0	0	0	0	0	0	151	27	24
19:00	1	6	56	42	4	0	0	0	0	0	0	0	0	109	27	24
20:00	1	10	53	27	2	0	0	0	0	0	0	0	0	93	26	23
21:00	1	9	44	22	3	0	0	0	0	0	0	0	0	79	26	23
22:00	0	7	28	19	2	0	0	0	0	0	0	0	0	56	27	23
23:00	0	1	26	20	2	0	0	0	0	0	0	0	0	49	27	24
Total	30	213	1085	950	101	3	0	0	0	0	0	0	1	2383		
%	1.3%	8.9%	45.5%	39.9%	4.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	02:00	11:00	11:00	09:00	09:00	00:00								11:00		
Vol.	3	18	83	66	10	1								168		
PM Peak	16:00	12:00	13:00	16:00	17:00	13:00							14:00	12:00		
Vol.	8	21	86	77	13	1							1	186		

Stats

15th Percentile : 19 MPH  
50th Percentile : 23 MPH  
85th Percentile : 27 MPH  
95th Percentile : 28 MPH

Mean Speed(Average) : 24 MPH  
10 MPH Pace Speed : 20-29 MPH  
Number in Pace : 2035  
Percent in Pace : 85.4%  
Number of Vehicles > 30 MPH : 85  
Percent of Vehicles > 30 MPH : 3.6%

South Street  
north of Main Street  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio  
SB

165178 D Speed  
Site Code: T0655

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
07/21/ 16	0	0	8	12	1	0	0	0	0	0	0	0	0	21	28	25
01:00	1	2	3	2	1	0	0	0	0	0	0	0	0	9	28	22
02:00	0	0	2	1	1	0	0	0	0	0	0	0	0	4	31	26
03:00	0	0	2	3	1	0	0	0	0	0	0	0	0	6	29	26
04:00	0	0	5	3	2	0	0	0	0	0	0	0	0	10	30	25
05:00	0	4	19	26	5	1	0	0	0	0	0	0	0	55	28	25
06:00	1	13	73	74	11	3	1	0	0	0	0	0	0	176	28	25
07:00	11	23	98	82	13	3	0	0	0	0	0	0	0	230	27	23
08:00	4	32	113	76	12	0	0	0	0	0	0	0	0	237	27	23
09:00	1	12	67	56	13	1	0	0	0	0	0	0	0	150	28	24
10:00	1	9	60	61	11	0	0	0	0	0	0	0	0	142	28	25
11:00	1	14	57	55	15	1	0	0	0	0	0	0	0	143	28	24
12 PM	6	14	52	75	16	0	0	0	0	0	0	0	0	163	28	24
13:00	1	14	68	62	7	0	0	0	0	0	0	0	0	152	27	24
14:00	14	37	81	60	7	0	0	0	0	0	0	0	0	199	27	22
15:00	22	37	132	65	9	0	0	0	0	0	0	0	0	265	26	22
16:00	33	50	156	73	7	0	0	0	0	0	0	0	0	319	26	21
17:00	47	54	178	59	9	1	0	0	0	0	0	0	0	348	25	20
18:00	7	35	116	74	12	0	0	0	0	0	0	0	0	244	27	23
19:00	2	16	74	58	11	0	0	0	0	0	0	0	0	161	27	24
20:00	1	7	61	36	4	0	0	0	0	0	0	0	0	109	27	24
21:00	1	4	53	32	8	0	0	0	0	0	0	0	0	98	27	24
22:00	0	8	31	28	4	0	0	0	0	0	0	0	0	71	27	24
23:00	1	0	17	13	2	0	1	0	0	0	0	0	0	34	28	25
Total	155	385	1526	1086	182	10	2	0	0	0	0	0	0	3346		
%	4.6%	11.5%	45.6%	32.5%	5.4%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	07:00	08:00	08:00	07:00	11:00	06:00	06:00							08:00		
Vol.	11	32	113	82	15	3	1							237		
PM Peak	17:00	17:00	17:00	12:00	12:00	17:00	23:00							17:00		
Vol.	47	54	178	75	16	1	1							348		

Stats

15th Percentile : 18 MPH  
50th Percentile : 22 MPH  
85th Percentile : 27 MPH  
95th Percentile : 29 MPH

Mean Speed(Average) : 23 MPH  
10 MPH Pace Speed : 20-29 MPH  
Number in Pace : 2612  
Percent in Pace : 78.1%  
Number of Vehicles > 30 MPH : 158  
Percent of Vehicles > 30 MPH : 4.7%

South Street  
north of Main Street  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio  
SB

165178 D Speed  
Site Code: T0655

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
07/22/																
16	0	1	4	9	1	0	0	0	0	0	0	0	0	15	28	25
01:00	1	3	7	6	0	0	0	0	0	0	0	0	0	17	26	22
02:00	0	0	3	2	0	0	0	0	0	0	0	0	0	5	27	24
03:00	0	0	5	2	0	0	0	0	0	0	0	0	0	7	26	23
04:00	0	0	2	8	1	0	0	0	0	0	0	0	0	11	28	27
05:00	1	4	21	17	5	0	0	0	0	0	0	0	0	48	28	24
06:00	2	6	50	71	7	0	0	0	0	0	0	0	0	136	28	25
07:00	0	21	100	61	10	1	0	0	0	0	0	0	0	193	27	24
08:00	4	34	105	53	7	0	0	0	0	0	0	0	0	203	26	23
09:00	1	17	86	39	6	0	0	0	0	0	0	0	0	149	26	23
10:00	1	25	57	55	6	0	0	0	0	0	0	0	0	144	27	23
11:00	4	22	81	50	7	1	0	0	0	0	0	0	0	165	27	23
12 PM	5	25	62	72	4	0	0	0	0	0	0	0	0	168	27	23
13:00	5	25	80	54	11	1	0	0	0	0	0	0	0	176	27	23
14:00	14	25	105	80	9	1	0	0	0	0	0	0	0	234	27	23
15:00	10	41	138	81	10	1	0	0	0	0	0	0	0	281	27	23
16:00	41	68	133	77	8	1	0	0	0	0	0	0	0	328	26	21
17:00	36	46	137	68	8	1	0	0	0	0	0	0	0	296	26	21
18:00	10	33	82	73	8	0	0	0	0	0	0	0	0	206	27	23
19:00	1	13	66	50	2	0	0	0	0	0	0	0	0	132	27	23
20:00	3	27	50	34	2	0	1	0	0	0	0	0	0	117	26	22
21:00	0	13	44	16	3	0	0	0	0	0	0	0	0	76	26	23
22:00	0	3	27	31	3	1	0	0	0	0	0	0	0	65	28	25
23:00	0	2	23	21	2	0	0	0	0	0	0	0	0	48	27	24
Total	139	454	1468	1030	120	8	1	0	0	0	0	0	0	3220		
%	4.3%	14.1%	45.6%	32.0%	3.7%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	08:00	08:00	08:00	06:00	07:00	07:00								08:00		
Vol.	4	34	105	71	10	1								203		
PM Peak	16:00	16:00	15:00	15:00	13:00	13:00	20:00							16:00		
Vol.	41	68	138	81	11	1	1							328		

Stats

15th Percentile : 17 MPH  
50th Percentile : 22 MPH  
85th Percentile : 27 MPH  
95th Percentile : 28 MPH

Mean Speed(Average) : 23 MPH  
10 MPH Pace Speed : 20-29 MPH  
Number in Pace : 2498  
Percent in Pace : 77.6%  
Number of Vehicles > 30 MPH : 105  
Percent of Vehicles > 30 MPH : 3.3%

South Street  
north of Main Street  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio  
SB

165178 D Speed  
Site Code: T0655

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
07/23/ 16	0	0	7	11	2	0	0	0	0	0	0	0	0	20	28	26
01:00	0	3	9	7	0	0	0	0	0	0	0	0	0	19	26	23
02:00	2	2	3	3	1	0	0	0	0	0	0	0	0	11	27	21
03:00	0	1	2	2	0	0	0	0	0	0	0	0	0	5	27	23
04:00	0	0	1	1	0	0	0	0	0	0	0	0	0	2	27	25
05:00	0	1	8	5	3	0	0	0	0	0	0	0	0	17	29	25
06:00	2	1	8	26	3	0	0	0	0	0	0	0	0	40	28	25
07:00	3	5	24	31	4	0	0	0	0	0	0	0	0	67	28	24
08:00	1	5	52	50	5	2	0	0	0	0	0	0	0	115	27	25
09:00	1	17	55	63	6	1	0	0	0	0	0	0	0	143	27	24
10:00	3	7	66	62	10	0	0	0	0	0	0	0	0	148	28	24
11:00	2	21	90	82	4	0	0	0	0	0	0	0	0	199	27	24
12 PM	1	8	76	65	12	2	0	0	0	0	0	0	0	164	28	25
13:00	0	8	62	63	14	1	0	0	0	0	0	0	0	148	28	25
14:00	2	12	73	77	13	0	0	0	0	0	0	0	0	177	28	24
15:00	2	16	71	68	12	0	0	0	0	0	0	0	0	169	28	24
16:00	5	7	49	74	8	1	0	1	0	0	0	0	0	145	28	25
17:00	2	5	50	73	7	2	0	0	0	0	0	0	0	139	28	25
18:00	0	13	58	56	10	1	0	0	0	0	0	0	0	138	28	24
19:00	3	12	52	54	12	1	0	0	0	0	0	0	0	134	28	24
20:00	0	5	54	41	6	1	0	0	0	0	0	0	0	107	27	24
21:00	1	7	26	27	8	0	0	0	0	0	0	0	0	69	28	24
22:00	0	6	39	19	1	0	0	0	0	0	0	0	0	65	26	23
23:00	0	2	22	20	3	0	0	0	0	0	0	0	0	47	27	25
Total	30	164	957	980	144	12	0	1	0	0	0	0	0	2288		
%	1.3%	7.2%	41.8%	42.8%	6.3%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	07:00	11:00	11:00	11:00	10:00	08:00								11:00		
Vol.	3	21	90	82	10	2								199		
PM Peak	16:00	15:00	12:00	14:00	13:00	12:00		16:00						14:00		
Vol.	5	16	76	77	14	2		1						177		

Stats

15th Percentile :	19 MPH
50th Percentile :	23 MPH
85th Percentile :	28 MPH
95th Percentile :	30 MPH
Mean Speed(Average) :	24 MPH
10 MPH Pace Speed :	20-29 MPH
Number in Pace :	1937
Percent in Pace :	84.7%
Number of Vehicles > 30 MPH :	128
Percent of Vehicles > 30 MPH :	5.6%

South Street  
north of Main Street  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio

165178 D Volume  
Site Code: T0655

Start	NB		SB		Combin		ed		7/21/201	
Time	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	6	Thu
12:00	9	41	8	40	17	81				
12:15	4	48	7	35	11	83				
12:30	5	46	4	45	9	91				
12:45	2	47	2	43	4	90	41	345		
01:00	6	38	2	36	8	74				
01:15	1	41	5	39	6	80				
01:30	6	37	1	38	7	75				
01:45	1	39	1	39	2	78	23	307		
02:00	0	41	0	39	0	80				
02:15	4	50	0	35	4	85				
02:30	1	47	2	53	3	100				
02:45	0	54	2	72	2	126	9	391		
03:00	1	52	2	77	3	129				
03:15	2	56	0	57	2	113				
03:30	2	64	3	71	5	135				
03:45	6	66	1	60	7	126	17	503		
04:00	2	65	3	76	5	141				
04:15	5	90	1	74	6	164				
04:30	4	92	3	75	7	167				
04:45	6	81	3	94	9	175	27	647		
05:00	7	110	9	89	16	199				
05:15	27	79	6	113	33	192				
05:30	26	97	24	87	50	184				
05:45	27	121	16	59	43	180	142	755		
06:00	29	91	39	68	68	159				
06:15	25	109	33	64	58	173				
06:30	40	71	54	52	94	123				
06:45	56	68	50	60	106	128	326	583		
07:00	58	51	40	44	98	95				
07:15	44	33	50	43	94	76				
07:30	58	31	72	38	130	69				
07:45	57	26	68	36	125	62	447	302		
08:00	63	40	61	27	124	67				
08:15	51	35	60	37	111	72				
08:30	50	30	64	31	114	61				
08:45	47	31	52	14	99	45	448	245		
09:00	39	42	30	30	69	72				
09:15	27	29	43	32	70	61				
09:30	23	15	38	24	61	39				
09:45	37	23	39	12	76	35	276	207		
10:00	31	17	30	30	61	47				
10:15	32	20	31	15	63	35				
10:30	34	14	41	10	75	24				
10:45	38	16	40	16	78	32	277	138		
11:00	42	7	33	9	75	16				
11:15	38	8	29	8	67	16				
11:30	31	8	35	8	66	16				
11:45	29	7	46	9	75	16	283	64		
Total	1133	2324	1183	2163	2316	4487				
Percent	48.9%	51.8%	51.1%	48.2%						
Day Total		3457		3346		6803				
Peak	07:30	-	05:30	-	07:30	-	05:00	-	-	-
Vol.	229	-	418	-	261	-	755	-	-	-
P.H.F.	0.909	-	0.864	-	0.906	-	0.948	-	-	-

South Street  
north of Main Street  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio

165178 D Volume  
Site Code: T0655

Start	NB		SB		Combin		ed		7/22/201	
Time	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	6	Fri
12:00	2	45	3	41	5	86				
12:15	3	49	4	37	7	86				
12:30	4	53	7	37	11	90				
12:45	1	42	1	53	2	95	357			
01:00	1	53	4	51	5	104				
01:15	5	49	5	48	10	97				
01:30	5	43	4	44	9	87				
01:45	3	47	4	33	7	80	368			
02:00	0	59	2	47	2	106				
02:15	2	52	0	58	2	110				
02:30	0	63	0	68	0	131				
02:45	1	58	3	61	4	119	466			
03:00	0	60	0	63	0	123				
03:15	5	62	2	58	7	120				
03:30	1	76	2	85	3	161				
03:45	3	70	3	75	6	145	549			
04:00	2	92	3	81	5	173				
04:15	4	75	3	90	7	165				
04:30	2	85	2	70	4	155				
04:45	8	94	3	87	11	181	674			
05:00	10	96	4	82	14	178				
05:15	13	78	9	99	22	177				
05:30	28	99	19	57	47	156				
05:45	23	77	16	58	39	135	646			
06:00	22	88	29	76	51	164				
06:15	26	79	34	46	60	125				
06:30	46	53	39	48	85	101				
06:45	38	56	34	36	72	92	482			
07:00	47	46	42	39	89	85				
07:15	54	43	39	28	93	71				
07:30	51	30	55	35	106	65				
07:45	58	34	57	30	115	64	285			
08:00	49	28	48	34	97	62				
08:15	49	35	52	29	101	64				
08:30	42	26	43	34	85	60				
08:45	48	27	60	20	108	47	233			
09:00	30	19	36	26	66	45				
09:15	31	32	31	12	62	44				
09:30	41	27	32	25	73	52				
09:45	39	19	50	13	89	32	173			
10:00	42	18	47	19	89	37				
10:15	34	24	30	17	64	41				
10:30	34	18	37	15	71	33				
10:45	26	19	30	14	56	33	144			
11:00	37	16	27	10	64	26				
11:15	41	11	43	14	84	25				
11:30	51	13	43	14	94	27				
11:45	45	12	52	10	97	22	100			
Total	1107	2350	1093	2127	2200	4477				
Percent	50.3%	52.5%	49.7%	47.5%						
Day Total		3457		3220		6677				
Peak	07:15	-	04:45	-	07:30	-	04:30	-	07:30	-
Vol.	212	-	367	-	212	-	338	-	419	-
P.H.F.	0.914	-	0.927	-	0.930	-	0.854	-	0.911	-



South Street  
north of Main Street  
City, State: Tewksbury, MA  
Client: TEC / S.Gregorio

165178 D Volume  
Site Code: T0655

Start	NB				SB				Combin ed		7/23/201 6 Sat	
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.	
12:00	11		36		9		29		20		65	
12:15	5		50		4		46		9		96	
12:30	4		58		3		45		7		103	
12:45	4	24	42	186	4	20	44	164	8	44	86	350
01:00	10		44		3		36		13		80	
01:15	7		48		6		36		13		84	
01:30	6		41		4		38		10		79	
01:45	6	29	45	178	6	19	38	148	12	48	83	326
02:00	4		47		2		50		6		97	
02:15	4		53		6		34		10		87	
02:30	5		36		3		40		8		76	
02:45	1	14	44	180	0	11	53	177	1	25	97	357
03:00	2		45		0		36		2		81	
03:15	1		52		4		42		5		94	
03:30	2		45		1		46		3		91	
03:45	0	5	39	181	0	5	45	169	0	10	84	350
04:00	0		49		0		39		0		88	
04:15	3		45		1		34		4		79	
04:30	1		40		1		34		2		74	
04:45	3	7	41	175	0	2	38	145	3	9	79	320
05:00	3		48		3		32		6		80	
05:15	6		25		3		35		9		60	
05:30	10		36		4		38		14		74	
05:45	7	26	33	142	7	17	34	139	14	43	67	281
06:00	9		37		4		40		13		77	
06:15	5		39		6		37		11		76	
06:30	11		32		13		35		24		67	
06:45	10	35	43	151	17	40	26	138	27	75	69	289
07:00	21		40		11		37		32		77	
07:15	22		22		19		35		41		57	
07:30	18		21		13		37		31		58	
07:45	27	88	26	109	24	67	25	134	51	155	51	243
08:00	21		20		33		26		54		46	
08:15	27		29		28		28		55		57	
08:30	30		19		26		22		56		41	
08:45	23	101	25	93	28	115	31	107	51	216	56	200
09:00	38		30		36		16		74		46	
09:15	30		18		34		18		64		36	
09:30	41		14		35		20		76		34	
09:45	41	150	17	79	38	143	15	69	79	293	32	148
10:00	38		8		40		16		78		24	
10:15	47		16		28		23		75		39	
10:30	35		17		48		14		83		31	
10:45	37	157	15	56	32	148	12	65	69	305	27	121
11:00	48		13		44		10		92		23	
11:15	34		11		48		5		82		16	
11:30	39		10		56		21		95		31	
11:45	47	168	15	49	51	199	11	47	98	367	26	96
Total	804		1579		786		1502		1590		3081	
Percent	50.6%		51.2%		49.4%		48.8%					
Day Total		2383			2288				4671			
Peak	11:00	-	00:15	-	11:00	-	02:00	-	11:00	-	00:15	-
Vol.	168	-	194	-	199	-	177	-	367	-	365	-
P.H.F.	0.875		0.836		0.888		0.835		0.936		0.886	

## Appendix E. Road Safety Audit References

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## Road Safety Audit References

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